



Course Syllabus

ELPT 1325 – National Electrical Code

Catalog Description: An introductory study of the National Electric Code (NEC) for those employed in fields requiring knowledge of the Code, with emphasis on wiring design, protection, methods, and materials, equipment for general use, and basic calculations.

Lecture hours = 3, Lab hours = 0

Prerequisites: None

Semester Credit Hours: 3

Lecture Hours per Week: 3

Lab Hours per Week: 0

Extended hours:

Contact Hours per Semester: 48

State Approval Code: 46.0301

Class section meeting time: Online—students are expected to spend at least 3 hours per week reading, reviewing, and participating in assigned activities for successful completion of this course.

Alternate Operations During Campus Closure: In the event of an emergency or announced campus closure due to a natural disaster or pandemic, it may be necessary for Panola College to move to altered operations. During this time, Panola College may opt to continue delivery of instruction through methods that include, but are not limited to the online learning management system (CANVAS), online conferencing, email messaging, and/or an alternate schedule. It is the responsibility of the student to monitor Panola College's website (www.panola.edu) for instructions about continuing courses remotely, CANVAS for each class for course-specific communication, and Panola College email for important general information.

Use of generated AI Permitted under some classroom circumstances with permission: There are situations throughout the course where you may be asked to use artificial intelligence (AI) tools to explore how they can be used. Outside of those circumstances, you should not use AI tools to generate content that will end up in any student work (assignments, activities, discussion responses, etc.). In such cases for Option #2, no more than 25% of the student work should be generated by AI. Use of any AI-generated content in this course without the instructor's consent qualifies as academic dishonesty and violates Panola College's standards of academic integrity

Instructional Goals and Purposes: The purpose of this course is to locate and interpret the sections in the NEC pertaining to electrical installations; calculate the size of conductors, boxes, raceways, and overcurrent protective devices for branch circuits supplying electrical equipment, calculate conductor size, overcurrent protection for service equipment as applied to building services and compute the size of branch circuits, feeders, and equipment for motors.

Learning Outcomes:

1. A brief history of the National Electrical Code.
2. Definitions and Terminology.
3. Boxes and Enclosures.
4. Cables.
5. Raceways and Conductors.
6. General Provisions: One-Family Dwellings.
7. Specific Provisions: One-Family Dwellings.
8. Load Calculations: One-Family Dwellings.
9. Services and Electrical Equipment: One-Family Dwellings.
10. General Provisions: Commercial Locations.
11. Non-dwelling Load Calculations.
12. Services, Feeders, and Equipment
13. Hazardous Locations.

Specific Course Objectives (includes SCANS):

After studying all materials and resources presented in the course, the student will be able to:

1. **Briefly discuss the history of the National Electrical Code.** SCANS (1 A-I, 1A-ii, 1A-iv, 1B-iii, 1B-iv, 1C-I, 1C-iv, 2A-I, 2A-iii, 2B-I, 2C-i, 2C- ii, 2C-iii, 2D-ii, 2D-iii, 2E-ii)
 - a. Identify the catalyst that brought about the National Electrical Code (NEC).
 - b. Discuss how the NEC began and the purpose of the NEC.
 - c. Understand how changes to the *Code* evolve.
 - d. Know what type of information is found within the NEC (layout).
 - e. Understand the NEC's concern with equipment and material standards.
 - f. Recognize various trademark logos that denote listed and labeled products.
 - g. Comprehend the role of nationally recognized testing laboratories (NRTL) and the National Electrical Manufacturers Association (NEMA) as well as the expanded role of the National Fire Protection Association (NFPA).
 - h. Recognize electrical requirements in addition to the NEC may exist and if so, that compliance is required.
2. **Definitions and Terminology.** SCANS (1 A-I, 1A-ii, 1A-iv, 1B-iii, 1B-iv, 1 C-I, 1C-iv, 2A-I, 2A-iii, 2B-I, 2C-i, 2C- ii, 2C-iii, 2D-ii, 2D-iii, 2E-ii)
 - a. Know the meaning of the term accessible when applied to (1) wiring methods and (2) when applied to equipment.
 - b. Know the four categories of branch circuits and be able to list their differences.
 - c. Know the correct definitions of words and phrases found in Article 100, which are crucial to the installation of a hazard-free electrical system.
 - d. Determine whether a load is continuous or noncontinuous.
 - e. Know the difference between branch-circuit conductors and feeder conductors.
 - f. Know the terminology associated with grounded and grounding.
 - g. Give examples of damp, dry, and wet locations.
 - h. Determine which conductors are "neutral" conductors.
 - i. Comprehend the electrical vocabulary associated with the word service.
 - j. Understand that the authority having jurisdiction (AHJ) could provide special permission, which is defined as **written consent**.

3. **Boxes and Enclosures.** SCANS (1 A-I, 1A-ii, 1A-iv, 1B-iii, 1B-iv, 1C-I, 1C-iv, 2A-I, 2A-iii, 2B-I, 2C-i, 2C- ii, 2C-iii, 2D-ii, 2D-iii, 2E-ii)
 - a. Perform box fill calculations.
 - b. Understand additional markings on boxes.
 - c. Describe the general installation requirements for boxes.
 - d. Describe box and luminaire support requirements.
 - e. Size junction and pull boxes.
 - f. Be able to determine the cubic-inch capacity of boxes (metal and nonmetallic) when installing 6 AWG and smaller conductors.
 - g. Understand calculation procedures for junction boxes containing 4 AWG and larger conductors.

4. **Cables.** SCANS (1 A-I, 1A-ii, 1A=iv, 1B-iii, 1B-iv, 1C-I, 1C-iv, 2A-I, 2A-iii, 2B-I, 2C-i, 2C- ii, 2C-iii, 2D-ii, 2D-iii, 2E-ii)
 - a. Understand the general installation requirements for cable systems.
 - b. Explain conductor identification and the permissible re-identification of certain conductors.
 - c. Discuss grounded conductors provided at switch locations.
 - d. Discuss grounded conductors provided for the future.
 - e. Discuss underground installations for both direct burial and raceway-protected conductors and cables.
 - f. Discuss special application cables.

5. **Raceways and Conductors.** SCANS (1 A-I, 1A-ii, 1A-iv, 1B-iii, 1B-iv, 1C-I, 1C-iv, 2A-I, 2A-iii, 2B-I, 2C-i, 2C- ii, 2C-iii, 2D-ii, 2D-iii, 2E-ii)
 - a. General Provisions
 - b. List the differences between non-flexible conduit (and tubing) and flexible conduit.
 - c. Determine raceway fill.
 - d. Understand conductor ampacity correction factors and conductor temperature limitations.

6. **General Provisions: One-Family Dwellings** SCANS (1 A-I, 1A-ii, 1A=iv, 1B-iii, 1B-iv, 1C-I, 1C-iv, 2A-I, 2A-iii, 2B-I, 2C-i, 2C- ii, 2C-iii, 2D-ii, 2D-iii, 2E-ii)
 - a. Electrical floor plan.
 - b. Branch Circuits.
 - c. Receptacles.
 - d. Receptacle replacements.
 - e. Receptacles requiring AFCI protection.
 - f. Other considerations when replacing receptacles
 - g. Lighting and switching
 - h. Outdoor receptacles and lighting.

7. **Specific Provisions: One-Family Dwellings.** SCANS (1 A-I, 1A-ii, 1A-iv, 1B-iii, 1B-iv,1C-I, 1C-iv, 2A-I, 2A-iii, 2B-I, 2C-i, 2C- ii, 2C-iii, 2D-ii, 2D-iii, 2E-ii)
 - a. Kitchens, Dining Rooms, and Breakfast Rooms.
 - b. Hallways and stairways.
 - c. Clothes Closets.
 - d. Bathrooms.
 - e. Basements and Garages.
 - f. Laundry Areas.
 - g. Attic and Crawl Spaces.

8. **Load Calculations: One-Family Dwellings.** SCANS (1 A-I, 1A-ii, 1A-iv, 1B-iii, 1B-iv, 1C-I, 1C-iv, 2A-I, 2A-iii, 2B-I, 2C-i, 2C- ii, 2C-iii, 2D-ii, 2D-iii, 2E-ii)
 - a. Compiling information essential to Load Calculations.
 - b. Standard method.

- c. Optional method.
9. **Services and Electrical Equipment: One-Family Dwellings.** SCANS (1 A-I, 1A-ii, 1A-iv, 1B-iii, 1B-iv, 1C-I, 1C-iv, 2A-I, 2A-iii, 2B-I, 2C-i, 2C- ii, 2C-iii, 2D-ii, 2D-iii, 2E-ii)
 - a. Service Entrance Wiring Methods.
 - b. Service and Outside Wiring Clearances.
 - c. Working Space Around Equipment.
 - d. Service Equipment and Panelboards.
 - e. Grounding.
 10. **General Provisions: Commercial Locations.** SCANS (1 A-I, 1A-ii, 1A-iv, 1B-iii, 1B-iv, 1C-I, 1C-iv, 2A-I, 2A-iii, 2B-I, 2C-i, 2C- ii, 2C-iii, 2D-ii, 2D-iii, 2E-ii)
 - a. Branch Circuits
 - b. Receptacles.
 - c. Lighting.
 11. **Non-dwelling Load Calculations.** SCANS (1 A-I, 1A-ii, 1A-iv, 1B-iii, 1B-iv, 1C-I, 1C-iv, 2A-I, 2A-iii, 2B-I, 2C-i, 2C- ii, 2C-iii, 2D-ii, 2D-iii, 2E-ii)
 - a. Non-dwelling load calculations.
 - b. Sample Load Calculation: Bank.
 - c. Sample Load Calculation: Store.
 12. **Services, Feeders, and Equipment: Commercial Locations.** SCANS (1 A-I, 1A-ii, 1A-iv, 1B-iii, 1B-iv, 1C-I, 1C-iv, 2A-I, 2A-iii, 2B-I, 2C-i, 2C- ii, 2C-iii, 2D-ii, 2D-iii, 2E-ii)
 - a. Clearances and Working Space.
 - b. Switchboards, Switchgear, and Panelboards.
 - c. Separately Derived Systems.
 - d. Busways.
 13. **General Provisions: Commercial Locations.** SCANS (1 A-I, 1A-ii, 1A-iv, 1B-iii, 1B-iv, 1C-I, 1C-iv, 2A-I, 2A-iii, 2B-I, 2C-i, 2C- ii, 2C-iii, 2D-ii, 2D-iii, 2E-ii)
 - a. Branch Circuits
 - b. Receptacles.
 - c. Lighting
 14. **Hazardous Locations.** SCANS (1 A-I, 1A-ii, 1A-iv, 1B-iii, 1B-iv, 1C-I, 1C-iv, 2A-I, 2A-iii, 2B-I, 2C-i, 2C- ii, 2C-iii, 2D-ii, 2D-iii, 2E-ii)
 - a. Class I Locations.
 - b. Class II Locations.
 - c. Class III Locations.

- **Course Content:**

A general description of lecture/discussion topics included in this course is listed in the Learning Objectives / Specific Course Objectives sections of this syllabus.

Students in all sections of this course will be required to study assigned materials and complete quizzes and exams to assess understanding and comprehension.

- **Methods of Instruction/Course Format/Delivery:**

Students in the Internet class will be required to take quizzes and exams using a secure exam proctor software through Canvas, at an approved testing facility, or they may also be administered by the instructor. Students in hybrid classes will have both in-class and online assignments. Resources for this course, provided through Canvas, include the following Sections in Canvas....

- Modules: Chapter study materials, self-assessment exercises, quizzes, and exams
- Announcements and Recent Activities List: Instructor Announcements
- Inbox: Email (to communicate with instructor and classmates inside Canvas)
- Grades: Student grades
- Other sections, as assigned by the Instructor: Students in both the traditional and Internet classes should use the People feature within Canvas (includes Canvas Email) to communicate with the instructor. Using Canvas Email located in the "Inbox" menu gives the student access to the instructor and other classmates without having to remember or type email addresses; the student just selects a name from the list. The instructor will attempt to respond to all Canvas emails within 24 hours. For example, if a student makes an appointment with the instructor through Canvas email to take an exam, the instructor will reply to the student's Canvas email – if the instructor does not reply within the time needed, call the instructor's at his or her office. Please, always include in the subject line of the Canvas email, the student's name, course number, and course section number.

- **Major Assignments / Assessments:**

The following items will be assigned and assessed during the semester and used to calculate the student's final grade.

- Unit Quizzes

After working through the chapters, the student will take quizzes on the chapters studied. Quizzes will generally contain True/False, Multiple Choice, Matching, and/or Fill In-The-Blank questions.

- Competency Test

After working through the chapter, the student will submit written or typed answers to the competency test questions. Each question has a two-part answer. The answer to the question, and the reference, which is where the answer is located in the National Electrical Codebook.

- Exams

Multiple exams may be given during the semester with the final exam being cumulative in one or two parts will assess the student's various skills and may include lab exercises.

- Attendance

Students are expected to log into the course each week to check for new assignments and information. Students are also required to attend Zoom or online meetings.

- **Course Grade:**

The grading scale for this course is as follows:

Category Percentage:

- Unit Quizzes 30%
- Competency Test 30%
- Exams 40%

- **Grading Notes:**

Late Work: All listed assignments are due according to the due date provided in Canvas and on the course calendar if you do not complete the assignments on time a **5% per day penalty** will automatically be applied to all assignments. If you have missed an assignment due to an approved class absence please contact your instructor for further instructions.

Missed Exams: Missed exams due to legitimate reasons should be taken before the reporting of a midterm or final grade as applicable. It is the responsibility of the student to reschedule the makeup with the instructor. The Instructor reserves the right to change the test format of any makeup. Instructors are not required to issue make-up work for an unexcused class absence Instructor also reserves the right to give full or partial credit for any makeup work that is allowed and that resulted from an unexcused absence.

Missed Quizzes: Missed quizzes due to legitimate reasons should be rescheduled within one week of the scheduled quiz or a date assigned by the Instructor. It is the responsibility of the student to reschedule makeup quizzes. The Instructor reserves the right to change the test format of the makeup quiz. The instructor is not required to make up work for unexcused class absences. The instructor reserves the right to give full or partial credit for any makeup work that is allowed resulting from an unexcused absence.

Attendance: When an instructor feels that a student has been absent to such a degree as to invalidate the learning experience, the instructor may recommend to the Vice President of Instruction

that the student be withdrawn from the course. The student is responsible for seeing that he or she has been officially withdrawn from a class. A student who stops attending or logging into a class without officially withdrawing from that class will be given a failing grade; consequently, the student must follow official withdrawal procedures in the Student Success Center.

Plagiarism: Plagiarism shall be defined as appropriating, buying, receiving as a gift, or obtaining by any other means, another person's work and the unacknowledged submission or incorporation of it in one's own written work. All papers submitted to Canvas will be scanned with [turnitin.com](https://www.turnitin.com) and the instructor reserves the right to dock points based on the results.

Cheating: Cheating on a test shall include:

- a. Copying from another student's test
- b. Using test materials not authorized by the person administering the test
- c. Collaborating with or seeking aid from another student during a test without permission from the test administrator
- d. Knowingly using, buying, selling, stealing, or soliciting, in whole or part, the contents of an unadministered test.
- e. The unauthorized transporting or removal, in whole or in part, of the contents of the unadministered test.
- f. Substituting for another student, or permitting another student to substitute for one's self, to take a test.
- g. Bribing another person to obtain an unadministered test or information about an unadministered test.
- h. If a student is observed cheating they will be sent home immediately counted absent and given a zero on the assignment they were cheating on.

Safety: All students are required in lab exercises to bring and wear the proper PPE as instructed by their instructor. Failure to do so will result in one warning; if a student continues to violate safety rules the student will be sent home and counted absent.

Class Conduct: All cell phones should be turned off in all classes. If you must receive a call notify your instructor and step out of the classroom. No cell phones are allowed during testing. No disruptive behavior is allowed in class; if a student is being disruptive as determined by the instructor one warning will be given. If the behavior persists, the student will be sent home and counted absent.

Some mandatory meetings outside of class days and times may be required to attend for credit. Valid excuses must be submitted with proof via email to your professor to avoid grade penalties.

Grading Scale A=90-100, B=80-89, C=70-79, D=60-69, F=59 and below

Texts, Materials, and Supplies:

- ***Illustrated Guide to the National Electrical Code***, 9th Edition by Charles R. Miller
ISBN-13: 9780357766804
- Calculator (Your cell phone is not a calculator!!)
- Notepad and pen or pencil

Required Readings:

- ***Illustrated Guide to the National Electrical Code***, 9th Edition by Charles R. Miller
- NFPA 70, National Electrical Code, 2023 Edition (Provided by Panola College located in the library)

Recommended Readings:

- None
- **Other:**
 - Courses conducted via video conferencing may be recorded and shared for instructional purposes by the instructor.
 - For current texts and materials, use the following link to access bookstore listings:
<https://www.panolacollegestore.com>
 - For testing services, use the following link: <https://www.panola.edu/elearning/testing.html>
 - If any student in this class has special classroom or testing needs because of a physical learning or emotional condition, please contact the ADA Student Coordinator in Support Services located in the Charles C. Matthews Student Center or go to <https://www.panola.edu/student-success/disability-support-services/> for more information.
 - Withdrawing from a course is the student's responsibility. Students who do not attend class and who do not withdraw will receive the grade earned for the course.
 - Student Handbook, *The Pathfinder*:
<https://www.panola.edu/student-success/documents/pathfinder.pdf>

SCANS CRITERIA

1) **Foundation skills are defined in three areas: basic skills, thinking skills, and personal qualities.**

- a) **Basic Skills:** A worker must read, write, perform arithmetic and mathematical operations, listen, and speak effectively. These skills include:
 - i) Reading: locating, understanding, and interpreting written information in prose and documents such as manuals, graphs, and schedules.
 - ii) Writing: communicate thoughts, ideas, information, and messages in writing, and create documents such as letters, directions, manuals, reports, graphs, and flowcharts.
 - iii) Arithmetic and Mathematical Operations: perform basic computations and approach practical problems by choosing appropriately from a variety of mathematical techniques.
 - iv) Listening: receive, attend to, interpret, and respond to verbal messages and other cues.
 - v) Speaking: Organize ideas and communicate orally.
- b) **Thinking Skills:** A worker must think creatively, make decisions, solve problems, visualize, know how to learn, and reason effectively. These skills include:
 - i) Creative Thinking: generating new ideas.
 - ii) Decision Making: specify goals and constraints, generate alternatives, consider risks, and evaluate and choose the best alternative.
 - iii) Problem-Solving: recognize problems and devise and implement a plan of action.
 - iv) Visualize ("Seeing Things in the Mind's Eye"): organize and process symbols, pictures, graphs, objects, and other information.
 - v) Knowing How to Learn: use efficient learning techniques to acquire and apply new knowledge and skills.
 - vi) Reasoning: discover a rule or principle underlying the relationship between two or more objects and apply it when solving a problem.
- c) **Personal Qualities:** A worker must display responsibility, self-esteem, sociability, self-management, integrity, and honesty.
 - i) Responsibility: Exerts a high level of effort and perseverance toward goal attainment.
 - ii) Self-Esteem: believe in one's self-worth and maintain a positive view of oneself.
 - iii) Sociability: demonstrate understanding, friendliness, adaptability, empathy, and politeness in group settings.
 - iv) Self-Management: assess oneself accurately, set personal goals, monitor progress, and exhibit self-control.
 - v) Integrity and Honesty: choose ethical courses of action.

2) **Workplace competencies are defined in five areas: resources, interpersonal skills, information, systems, and technology.**

- a) **Resources:** A worker must identify, organize, plan, and allocate resources effectively.
 - i) Time: select goal-relevant activities, rank them, allocate time, and prepare and follow schedules.
 - ii) Money: Use or prepare budgets, make forecasts, keep records, and make adjustments to meet objectives.
 - iii) Material and Facilities: Acquire, store, allocate, and use materials or space efficiently. Examples: construct a decision timeline chart; use computer software to plan a project; prepare a budget; conduct a cost/benefits analysis; design an RFP process; write a job description; develop a staffing plan.

- b) **Interpersonal Skills:** A worker must work with others effectively.
- i) Participate as a Member of a Team: contribute to a group effort.
 - ii) Teach Others New Skills.
 - iii) Serve Clients/Customers: work to satisfy customers' expectations.
 - iv) Exercise Leadership: communicate ideas to justify position, persuade and convince others, and responsibly challenge existing procedures and policies.
 - v) Negotiate: work toward agreements involving an exchange of resources, and resolve divergent interests.
 - vi) Work with Diversity: work well with men and women from diverse backgrounds.
- Examples: collaborate with a group member to solve a problem; work through a group conflict situation, train a colleague; deal with a dissatisfied customer in person; select and use appropriate leadership styles; use effective delegation techniques; conduct an individual or team negotiation; demonstrate an understanding of how people from different cultural backgrounds might behave in various situations.
- c) **Information:** A worker must be able to acquire and use information.
- i) Acquire and Evaluate Information.
 - ii) Organize and Maintain Information.
 - iii) Interpret and Communicate Information.
 - iv) Use Computers to Process Information.
- Examples: research and collect data from various sources; develop a form to collect data; develop an inventory record-keeping system; produce a report using graphics; make an oral presentation using various media; use online computer databases to research a report; use a computer spreadsheet to develop a budget.
- d) **Systems:** A worker must understand complex interrelationships.
- i) Understand Systems: know how social, organizational, and technological systems work and operate effectively with them.
 - ii) Monitor and Correct Performance: distinguish trends, predict impacts on system operations, diagnose deviations in systems' performance, and correct malfunctions.
 - iii) Improve or Design Systems: suggest modifications to existing systems and develop new or alternative systems to improve performance.
- Examples: draw and interpret an organizational chart; develop a monitoring process; choose a situation needing improvement, break it down, examine it, propose an improvement, and implement it.
- e) **Technology:** A worker must be able to work with a variety of technologies.
- i) Select Technology: choose procedures, tools, or equipment including computers and related technologies.
 - ii) Apply Technologies to Task: understand overall intent and proper procedures for setup and operation of equipment.
 - iii) Maintain and Troubleshoot Equipment: Prevent, identify, or solve problems with equipment, including computers and other technologies.
- Examples: read equipment descriptions and technical specifications to select equipment to meet needs; set up and assemble appropriate equipment from instructions; read and follow directions for troubleshooting and repairing equipment.