



Course Name	Electrical Safety - NFPA 70E (2021)
Credit Hours	4 Hours
Course Description	<p>This course equips electricians and other workers exposed to electrical hazards with knowledge needed to apply safety requirements from the NFPA 70E. We start by detailing the arrangement, scope, and purpose of the document, as well as define common terms. Then, we discuss securing an electrically safe work condition, lockout/tagout, energized work, grounding electrical equipment, arc flash and more. In summary, we clarify NFPA 70E safety practices used in the electrical industry. This course has no prerequisites.</p>
Reference Materials	NFPA 70E Standard for Electrical Safety in the Workplace. (2021 Edition)
Learning Outcomes	<p>At course completion, participants will:</p> <ul style="list-style-type: none">• Define the purpose, scope, and arrangement of the NFPA 70E.• List employer and employee responsibilities for maintaining compliance with the NFPA 70E.• Recognize a qualified person on the jobsite.• List safety requirements for contracted employees on a jobsite.• Describe testing and troubleshooting procedures on a jobsite.• Explain how to perform visual inspections of testing tools and equipment.• Explain equipment handling and storage procedures.• Recognize danger when working with equipment in wet and conductive areas.• Describe required GFCI and AFCI protection.• Explain lockout/tagout procedures.• List the eight steps for verifying an electrically safe working condition.• Explain the requirements for working on energized conductors, circuit parts, and equipment.• Define an arc-flash.• Describe an arc-flash assessment.• Define personal protective equipment (PPE).

- List types of PPE for head, hands, feet, and body protection.
- Describe an arc-flash boundary.
- Define “maintenance” per the NFPA 70E.
- Identify dangers surrounding overhead lines.
- Explain the need for protection of open wiring.
- Describe hazardous (classified) locations.
- Describe safe conduct around batteries.
- Define the term “special equipment”.
- Explain safety requirements for storage battery voltages above 50 volts.
- List safety-related work requirements for research and development labs.
- Discuss the danger associated with capacitors.
- Recognize a NFPA Annex.

Course Timed Syllabus

Attached

Method of Presentation

This online course uses text and graphics. Multiple choice questions are used to test how well the student understands the material. Each answer choice has a response which tells the student whether the selected answer is correct or not. A running score is displayed so each person can track their progress through the class. The learning event is asynchronous and formatted as a visual lecture.

Schedule and Location

This course may be taken at any time at www.tradesmance.com. The student may sign in and out of the course as many times as needed to complete the course.

Attendance Verification

This course employs an inactivity timer, which will automatically log a licensee out of the training if the system does not sense a mouse click within 30 minutes.

At the end of the course, the licensee must affirm their name, that they are the one who completed the course, and verify that their registration information is correct.

Method of Assessment

The licensee must complete all 50 multiple-choice questions between sections correctly to get credit for the course. If their first response is incorrect, students will have to try again until they choose the correct answer.

The course is also timed; participants will not get credit until they spend at least 200 active minutes in the course.

Online Review Access

To review this course, go to www.tradesmance.com and sign into the learning system using the login information below.

Username: uteltester

Password: UTELtester

Cost

\$49.00

Instructor

Jerry Durham (previously approved)

Electrical Safety (NFPA 70E 2021) Timed Syllabus

Section	Title	Questions	Minutes
1	<p>NFPA 70E-2021 Sections 90.1, 90.2</p> <p>Introduce electricians to the NFPA 70E Standard for Electrical Safety in the Workplace. Discuss the purpose of this document, along with who and what is covered by this NFPA Standard.</p>	1	4
2	<p>NFPA 70E-2021 Sections 90.3, 90.4</p> <p>Examine how the NFPA 70E Standard is arranged and the purpose of the included informative annexes. Review mandatory rules versus permissive rules, along with explanatory materials found in this document.</p>	1	4
3	<p>NFPA 70E-2021 Article 100</p> <p>Introduce 70E terms and definitions to establish consistency across NFPA 70E Articles. Article 100 definitions allows for the uniform application of requirements from the 70E Standard.</p>	1	4
4	<p>NFPA 70E-2021 Section 105.3</p> <p>Review both employer and employee responsibilities for implementing safe workplace practices and procedures.</p>	1	4
5	<p>NFPA 70E-2021 Sections 110.1 - 110.4</p> <p>Discuss the first priority when implementing safety-related work practices. Determine what is required for electrical conductors and circuit parts to be considered in an electrically safe working condition while discussing the increased risk of performing energized work. Identify what the NFPA declares must be demonstrated by the employer if energized work is to be performed.</p>	1	4
6	<p>NFPA 70E-2021 Section 110.5</p> <p>Outline the employer's responsibility toward implementing an electrical safety program that directs employee activity appropriate to the risk associated with electrical hazards on the job. Understand the NFPA Hierarchy of Risk Control Methods—always preferring to eliminate risk over safeguarding against it.</p>	1	4
7	<p>NFPA 70E-2021 Section 110.6</p> <p>Understand the importance of training requirements and who the requirements apply to. What is a Qualified Person? Retraining requirements. Types of training including lockout/tagout training and emergency response training. Training verification and documentation.</p>	1	4
8	<p>NFPA 70E-2021 Section 110.7</p> <p>Host employer and contract employer responsibilities toward safety on the jobsite: Hosting employers must notify contract employers of any hazards on the job site if hazards are covered in the NFPA 70E Standard and relate to the contract employer's work.</p>	1	4

9	<p>NFPA 70E-2021 Section 110.8</p> <p>Testing and troubleshooting procedures performed by qualified persons. Instruments and equipment used for testing and troubleshooting electrical equipment. Visual inspections and repair of testing tools and equipment.</p>	1	4
10	<p>NFPA 70E-2021 Section 110.9 (A) and (B)</p> <p>Understanding the responsibilities associated with cord- and plug-connected equipment, including cord- and plug-connected test instruments and extension cord sets. Equipment handling and storage. The requirements for equipment grounding, as well as proper grounding connections to be provided wherever grounding-type equipment is utilized.</p>	1	4
11	<p>NFPA 70E-2021 Section 110.9 (C) - (F)</p> <p>Performing visual inspections and repair of portable cord- and plug-connected equipment and cord sets. Working with cord- and plug-connected equipment in conductive and wet locations. Connecting attachment plugs and following portable equipment manufacturer's instructions.</p>	1	4
12	<p>NFPA 70E-2021 Section 110.10</p> <p>What is Ground-Fault Circuit-Interruptor (GFCI) protection? Does GFCI protection differ from overcurrent protection and arc-fault protection? Discuss the operating principles of these protection devices.</p>	1	4
13	<p>NFPA 70E-2021 Sections 110.10, 110.11, and 110.12</p> <p>Ground-Fault Circuit-Interrupter (GFCI) protection for employees. Rules against modifying overcurrent protection for circuits and conductors, including on a temporary basis. Using equipment according to manufacturer's instructions.</p>	1	4
14	<p>NFPA 70E-2021 Article 120</p> <p>What does it mean to establish an electrically safe work condition? What are some measures that can be taken to achieve this? What are the dangers of working on energized electrical circuits?</p>	1	4
15	<p>NFPA 70E-2021 Section 120.1</p> <p>What is a lockout/tagout program? What is the employer's responsibility toward a lockout/tagout program?</p>	1	4
16	<p>NFPA 70E-2021 Section 120.2</p> <p>Understanding lockout/tagout principles, including: Employee involvement / Procedure / Control of energy / Circuit interlocks / Control devices / Identification, and coordination.</p>	1	4
17	<p>NFPA 70E-2021 Section 120.3</p> <p>A look at lockout/tagout equipment and equipment requirements, such as equipment accepting an isolation lockout device. A look at the requirements for lockout devices and tagout devices.</p>	1	4

18	<p>NFPA 70E-2021 Section 120.4 (Simple Procedure) Understanding lockout/tagout procedure, including: Planning / Locating energy sources / Identifying persons exposed to electrical hazards / The person in charge / Identifying when a simple lockout/tagout procedure can be applied / Identifying control locations / De-energizing equipment (shutdown), and releasing stored</p>	1	4
19	<p>NFPA 70E-2021 Section 120.4 (Complex Procedure) Understanding the complex lockout/tagout procedure. When multiple locations, power sources, working crews, employers, etc. are involved and lockout/tagout is required, the complex procedure must be utilized.</p>	1	4
20	<p>NFPA 70E-2021 Section 120.5 Learning to establish and verify an electrically safe work condition: eight steps prescribed by the NFPA to verify an electrically safe work condition. The NFPA requires these steps to be performed in order.</p>	1	4
21	<p>NFPA 70E-2021 Sections 130.1, 130.2, 130.4, Reinforcing special 70E requirements concerning all work performed involving electrical hazards. Electrical safety-related work practices must be followed when an electrically safe work condition cannot be established. Understanding the requirements for working on energized electrical conductors and circuit parts when an electrically safe work condition cannot be established.</p>	1	4
22	<p>NFPA 70E-2021 Section 130.5 What is an arc-flash? What is an arc-flash risk assessment? What is PPE? Equipment labeling requirements for equipment likely to be serviced while energized.</p>	1	4
23	<p>NFPA 70E-2021 Section 130.7 (A),(B), and (C)(1 - 9) Types of approved PPE including: Head protection. Eye protection. Hearing protection. Body protection. Hand and arm protection. Foot protection.</p>	1	4
24	<p>NFPA 70E-2021 Section 130.7 (C)(10 - 14) Arc-flash protection. Arc-flash suits. Additional arc-flash protective equipment.</p>	1	4
25	<p>NFPA 70E-2021 Section 130.7 Tables Understanding the arc-flash PPE categories and arc-flash boundaries around equipment.</p>	1	4
26	<p>NFPA 70E-2021 Section 130.7 (D) Other types of protective equipment for performing work inside the restricted approach boundaries, such as insulated tools and equipment. Understanding barrier requirements around exposed, energized electrical conductors and circuit parts.</p>	1	4
27	<p>NFPA 70E-2021 Section 130.7 (E) Approved alerting techniques such as safety signs for dangerous areas, and tags for dangerous equipment. Other approved alerting means such as barricades and attendants stationed to provide</p>	1	4

28	<p>NFPA 70E-2021 Section 130.8 (A) - (D)</p> <p>Other precautions to be taken during personnel activity, such as staying aware of your surroundings. Functioning without impairment. Staying aware of changes in the job or task. Illumination anywhere that electrical hazards exist, and not reaching blindly into unseen spaces. Avoid working with an obstructed view and while wearing conductive articles.</p>	1	4
29	<p>NFPA 70E-2021 Section 130.8 (E) - (N)</p> <p>Additional precautions to be taken during personnel activities include limiting the use of conductive tools and materials. Understanding confined and enclosed spaces, and clear spaces. Working around doors and hinged panels. General housekeeping duties. Use of flammable materials and safety interlocks.</p>	1	4
30	<p>NFPA 70E-2021 Section 130.9 - 130.12</p> <p>Precautions when working within the limited approach boundaries and arc-flash boundaries around overhead lines. De-energizing or guarding contact with overhead lines. Approach distances surrounding overhead lines for unqualified persons. Vehicular and mechanical equipment near overhead lines. Underground electrical lines and cutting, drilling, removing, or rerouting these conductors.</p>	1	4
31	<p>NFPA 70E-2021 Section 200.1 (1),(2), and (3)</p> <p>Introducing safety-related maintenance and maintenance requirements for electrical equipment and installations when maintenance is directly associated with employee safety in the workplace. What type of electrical work does the 70E Standard</p>	1	4
32	<p>NFPA 70E-2021 Article 205</p> <p>Who is a qualified person for performing maintenance? Adhering to the manufacturer's suggested maintenance for electrical equipment. Maintenance of overcurrent devices, work spaces around equipment, enclosures that guard against and protect electrical conductors including for grounding and bonding. Maintaining indicators such as signs and equipment identification placards. Maintaining cords and cables.</p>	1	4
33	<p>NFPA 70E-2021 Article 210</p> <p>Maintaining electrical enclosures to reduce electrical hazards. Maintaining area enclosures that guard from hazards. Maintaining conductors, conductor insulation, and their protective devices.</p>	1	4
34	<p>NFPA 70E-2021 Article 215</p> <p>Requirements for covers that serve to protect electrical wiring system components. The protection of open wiring. Maintaining raceways and cable trays that provide protection for conductors.</p>	1	4

35	<p>NFPA 70E-2021 Article 220</p> <p>Addressing the protection of controller devices. Including any electrical equipment that governs the starting, stopping, direction of motion, acceleration, and speed of rotating equipment, or any other power utilization apparatus in the workplace.</p>	1	4
36	<p>NFPA 70E-2021 Article 225</p> <p>Maintaining fuses, fuse clips, and fuse holders. Molded-case circuit breaker maintenance, including case integrity, operating handles, and termination screws. Performing circuit breaker testing after electrical faults.</p>	1	4
37	<p>NFPA 70E-2021 Article 230</p> <p>For rotating equipment, terminal boxes, terminal chambers, and enclosures shall be maintained to guard against unintentional contact with exposed energized conductors and circuit parts and other electrical hazards.</p>	1	4
38	<p>NFPA 70E-2021 Article 235</p> <p>Understanding hazardous (classified) locations and maintenance requirements for hazardous (classified) locations. Introduction to the 70E criteria for maintaining equipment and installations in hazardous locations.</p>	1	4
39	<p>NFPA 70E-2021 Article 240</p> <p>Safe conduct around batteries and battery rooms including observing ventilation requirements and eye and body wash station requirements. When battery system designs require ventilation, the ventilation systems must be provided and maintained. Eye and body wash apparatus must be maintained.</p>	1	4
40	<p>NFPA 70E-2021 Article 245</p> <p>Understanding maintenance requirements for portable electric tools and equipment. Maintenance extends to attachment plugs, receptacles, cover plates, and cord connectors for this equipment. All of these must be maintained according to the requirements found in Section 245.1 of the 70E Standard.</p>	1	4
41	<p>NFPA 70E-2021 Article 250</p> <p>Maintenance requirements for protective equipment contributing to personal safety must be adhered to. Section 250.1 of the 70E Standard acknowledges 14 equipment types that must be maintained in a safe working condition. Inspection and testing of protective equipment and protective tools must be performed.</p>	1	4
42	<p>NFPA 70E-2021 Article 300</p> <p>Requirements for employers to provide safety-related work practices and employee training for any special electrical equipment in the workplace.</p>	1	4

43	<p>NFPA 70E-2021 Article 310</p> <p>Requirements for employers to provide safety-related work practices around electrolytic cells. Safety-related work practices include understanding hazards associated with electrical energy from cells. Employee training. Qualified and unqualified persons. Safeguarding of employees in the cell line working zone. Arc flash assessment for cell areas. PPE for cell areas.</p>	1	4
44	<p>NFPA 70E-2021 Article 320</p> <p>Electrical safety requirements for safeguarding employees working with exposed stationary storage batteries exceeding 50 volts.</p>	1	4
45	<p>NFPA 70E-2021 Article 330</p> <p>Requirements for employers to provide safety-related work practices for maintaining lasers and associated equipment. Defining terms associated with this practice. Personnel to be trained. Energized electrical testing. Required warning signs and labels.</p>	1	4
46	<p>NFPA 70E-2021 Article 340</p> <p>Recognizing the hazards associated with power electronic equipment. Identifying specific employer and employee responsibilities for these work environments.</p>	1	4
47	<p>NFPA 70E-2021 Article 350</p> <p>Understanding safety-related work requirements for research and development laboratories. Identifying specific measures and controls for personnel safety. Personnel protection for the safeguarding of employees while exposed to electrical hazards associated with research and development laboratories.</p>	1	4
48	<p>NFPA 70E-2021 Article 360</p> <p>Safety-related requirements for work performed with and around capacitors. Understanding stored energy hazard thresholds associated with capacitors. Performing risk assessment for working with capacitors, and establishing electrically safe working conditions around capacitors.</p>	1	4
49	<p>NFPA 70E-2021 Information Annex A-I</p> <p>A look at the 70E Informative Annex sections including additional publications. Limits of approach around energized areas of work. Incident energy and the arc flash boundary calculation methods. Typical electrical safety program guidelines, Risk assessment and risk control principles. Sample lockout/tagout programs. PPE selection. And job briefing and safety checklist samples.</p>	1	4

50	<p>NFPA 70E-2021 Information Annex J-R</p> <p>A look at the remaining 70E Informative Annex sections including a sample of an energized electrical work permit. The categories of 70E recognized electrical hazards. Application of safeguards in a cell line working zone. Understanding layering PPE for added protection and the total system arc rating. Examples of procedures and policies for working near overhead electrical lines. General design with safety in mind. Human performance when it comes to workplace electrical safety. And suggestions for safely working with capacitors.</p>	1	4
Totals:		50	200
Total Required:			200