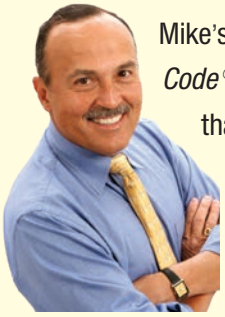
Mike Holt's

ELECTRICAL APPRENTICESHIP PROGRAM

Based on the 2020 NEC®

ABOUT MIKE HOLT ENTERPRISES



Mike's passion for the electrical industry and for educating others on the *National Electrical Code®* began in 1972 while studying for a local electrical exam. His inability to find material that was well-written or properly illustrated gave him the idea to start a school that would be devoted to electrical training.

In 1975 Mike Holt Enterprises was created with very clear principles of making electrical training more effective, and providing books that were straightforward and easy to understand. This desire to create books to help electricians pass exams grew into the nation's largest "Electrical-Only" publisher that specializes in books, videos, online training, school curriculum, and seminars—changing the way the *NEC®* and electrical training is taught.

Forty years later, these standards continue to guide us. Our products are designed for student success:

- **Easy to Understand**. Our text simplifies difficult technical topics and includes clear, step-by-step, detailed explanations.
- **Visual**. We include full-color, detailed, instructional graphics that help students visualize what's being taught.
- **Effective**. Our Instructor Resources are designed to save teachers time and give them tools to be more successful in reaching their students.

Our primary goal as a company is to change the lives of electrical professionals through our products. We genuinely care about helping our instructors and schools prepare the next generation of electrical professionals with the skills and knowledge they need to succeed. We're here to help you every step of the way and encourage you to contact us, so we can be a part of your success.

Produced and Printed in the USA
December 2020

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ABOUT THIS PROGRAM

Mike Holt's Electrical Apprenticeship Program, Based on the 2020 NEC® has been developed with the goal of providing the knowledge required to become a competent journeyman electrician. The training resources used throughout this program have been selected to provide the most comprehensive education possible. Supplemented with Mike's instructional support material (such as presentations, videos, and practice exams), the program is tailored to meet the needs of different types of learners.

THE SCOPE OF THIS PROGRAM

This program is organized into separate study sessions that are designed to deliver a logical flow of the material and adaptable to any personal or institutional calendar. Whether your course delivery is one, two, or even five days per week, this lesson plan can accommodate your schedule.

From day one, and maintained throughout the program, strong emphasis is placed on safe work practices. The program covers the *National Electrical Code®* and Safety in a manner relevant to today's apprentices, preparing them for their journeyman's exam and the job site.

Level 1—The first level begins with the study of some of OSHA's construction safety rules and introduces apprentices to the principles associated with electricity, electrical theory, and the basics of electrical systems. These basic fundamentals are necessary in understanding complex *NEC* requirements covered throughout the program. Digital multimeter principles will also be covered. In the latter part of the level students will be introduced to, and begin utilizing, the *National Electrical Code*.

Level 2—This level continues the study of OSHA's construction safety rules and then focuses on the first three chapters of the *National Electrical Code*. Some equipment specific to alternating current will be introduced. Residential and commercial wiring methods and practices will also be covered in depth during this training level.

Level 3—This training level covers additional OSHA construction safety rules and Chapter 4 of the *NEC*, then focuses on common industrial applications, methods, and requirements. While motors and controls are the major focus area, hazardous locations, special applications, and Solar (PV) Photovoltaic and Energy Storage Systems are also introduced.

Level 4—This final level of the program covers advanced *Code* calculations in great detail. Electrical estimating is discussed in the first part of the level as well as a review of electrical theory and motor controls. Additional OSHA construction safety rules will be covered as well.

HOW TO USE THIS PROGRAM

This lesson plan considers that not all individuals and institutions operate on the same calendar schedule and is organized into time-flexible sessions and should be used as a guide for personal or class scheduling. This flexibility is intended to help guide

both classroom instructors and self-paced online learners, successfully through this course regardless of individual calendars. References to PowerPoint® and video presentations for classroom instruction are included along with the references to online presentations in the Capacitor®.

Each individual and each class is unique. As such the flow of this course will vary accordingly. Some parts of this course will move more quickly than the time suggested while other parts may require all of the time allotted. It's important to remember that this plan is flexible, and that time overlap is expected and will help to balance out individual learning pace ensuring that all course outcomes and objectives are met. Please make notes during the semester and provide us with your feedback so we can make this schedule better each year. Instructor led course quizzes and or assessments are at the instructor's discretion or as mandated by individual institution requirements.

We all learn differently, and the same methods of presentation and study don't necessarily bring the same results for each individual. Instructors should be aware of the differences in learning styles as you present this material to the class. Some students learn better visually and need to see diagrams and illustrations. Others learn from audible input such as lectures and class group discussions.

Hands-on learning is an important component of education, and most of it will be done on the job-site rather than in the classroom. However, when it's feasible, do bring equipment and material in to show the class. Just a little "show and tell" of components that your students haven't yet used, like control pushbuttons or AFCI breakers, can help add understanding to a lesson. When possible, try to supplement classroom instruction with field trips to view live construction projects showcasing the material being studied.

We recommend the lesson material be presented in the form of lecture and include visual aids when possible. PowerPoint® and video presentations using a large screen can be very beneficial, but it's understood that this type of equipment isn't always available. In some cases, what is available, may limit the presentation to the use of student books and whiteboards.

It's crucial that online (Capacitor®) self-paced or asynchronous learners take advantage and make use of all included presentations, videos, and extraneous links as part of their learning experience to enhance comprehension and reinforce retention of the material being presented.

Instructors should involve the students as much as possible. An example is how you would handle the questions that are assigned in the books: after completing the questions, have the students take turns reading the question and their answers so they're involved in the process. Don't just read the answers to your students and don't just post them. Do what you can to interact with your students in discussion and allow their input. Another example is to try and incorporate what your students might already be doing in the field and spend some time involving everyone in the discussion.

Answer questions honestly, and don't be afraid to tell your students if you don't know an answer. Of course, do take time to look it up—explain that you can't always know all the answers, but that you're there to help them in the learning process. Make sure your students understand their responsibility in the learning process—they need to do their part by reading and studying the information in their textbooks and participating in discussions. Let them know that learning is a life-long process, and there are always new things to learn in the electrical field.

You'll be successful as an instructor if you remember that we all started here and empathize with your students by providing encouragement and reassurance while they strive to achieve their personal goals and develop a respect for the electrical profession and a love for learning essential to a successful career in our ever changing industry.

LEVEL 1 OUTLINE

LEVEL 1 OBJECTIVES

Upon the completion of Level 1, students will possess the knowledge necessary to safely and proficiently perform the job duties and responsibilities expected of a first-year apprentice.

- They'll have built a foundation of knowledge about construction safety, electrical safety, and electrical theory that's necessary to understand the *National Electrical Code (NEC)*.
- They'll be introduced to the *Code* rules that are related to general wiring requirements, outlet box sizing, raceway sizing, and bonding and grounding.
- In addition, they'll learn how a multimeter is used in the field and receive a multimeter competency certification.

LEVEL 1 RESOURCES

Mike Holt's Apprenticeship Training Program is designed to use textbooks, PowerPoint® presentations, videos, labs/activities, review questions, and exams designed to enhance learning, comprehension, and retention of the material presented.

Videos

The instruction package includes videos that can played along with the textbook(s) (or viewed in their entirety) to provide a practical viewpoint of the material being (or to be) covered. If something isn't understood or misinterpreted, stop, go back, and play that section again until the topic being discussed is clear.

Mike and a panel of industry experts are featured on these videos. They carefully examine the topics in a way that's both educational and entertaining. You'll hear stories, discussions, and opinions that aren't covered in the textbooks thereby making them an invaluable practical source of information.

PowerPoint® Presentations

Also included in this instruction package are PowerPoint® presentations containing hundreds of slides that are synchronized with the textbook(s). These presentations are sorted by individual article or unit resulting in much smaller, less cumbersome files and make it easier to follow along side-by-side with the textbook.

Labs/Activities

One of the most enjoyable parts of learning is getting your hands on mechanical parts such as meters, wire, magnets, coils, light bulbs, switches, fuses, circuit breakers, receptacles, GFCIs, AFCIs, and basically anything that can be broken!

We strongly suggest you find or create labs that match the topic being studied as a hands-on experience to help students understand the material being covered. Seeing a mechanical concept in action makes it easier to understand the lesson being taught.

Testing

Testing, assessments, and exams are an important aspect of the learning process. Studies have shown that regardless of the result, students who are required to mentally recall a subject on a test are more likely to remember the content than those who didn't have this opportunity. Our program includes different options for testing including, textbook review questions and exams. (Online quizzes and exams are available in the blended and online programs.)

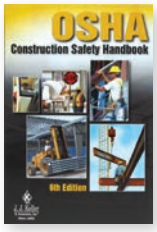
Textbook Testing. Our textbooks contain tests that have been designed to reinforce the learning process when the Online Testing Tools aren't used. We encourage you to have your students complete the textbook tests before taking the online tests to further reinforce their learning process.

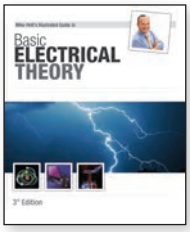
Online Testing. Our online testing program has been specifically designed to allow you to take advantage of today's blended or self-paced asynchronous learning environments to reinforce the material that's been covered.

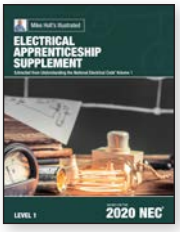
Books

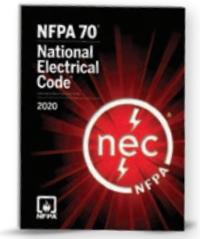
You'll be using the following books and we suggest you take a few moments to review the layout of each. Pay attention to the table of contents, the layout of the units and chapters, and the review questions.

- *OSHA Construction Safety Training Handbook, 6th Edition*
  J.J. Keller & Associates
  ISBN 978-1-60287-891-4, 2010
- *Mike Holt's Basic Electrical Theory, 3rd Edition*
  Mike Holt Enterprises
  ISBN 978-1-932685-39-8, 2011
- *Digital Multimeter Principles, 4th Edition*
  American Technical Publishers
  ISBN 978-0-8269-1506-1, 2010
- *Mike Holt's Apprenticeship Supplement Level 1*
  Mike Holt Enterprises
  ISBN 978-1-950431-25-0, 2020
- *National Electrical Code, 2020 Edition*
  National Fire Protection Association
  ISBN 978-145592297-0, 2019









LEVEL 1 LESSON PLAN—AT A GLANCE

Session	Quarter 1
1	**Introduction | Orientation | Tools | Safety** *Electrical hazards and safe working practices* **OSHA Construction Safety** *Electrical Safety and PPE*
2	**OSHA Construction Safety** **Falls | Ladders and Stairs | Scaffolds**
3	**Electrical Fundamentals–Unit 1** *Matter*
4	**Electrical Fundamentals–Unit 2** *Electron Theory*
5	**Electrical Fundamentals–Unit 3** *Magnetism*
6	**Electrical Fundamentals–Unit 4** *Electricity*
7	**Digital Multimeter Principles** *Chapters 1 through 4*
8	**Digital Multimeter Principles** *Chapters 5 through 9*
9	**Digital Multimeter Principles** *Chapter 10*
10	**Digital Multimeter Principles** *Review and Competency Test*
11	**Quarter 1 Review**
12	**Quarter 1 Exam**
13	**Lab/Activity** *3-4-way switching*

Session	Quarter 2
1	**Electrical Fundamentals–Unit 5** *Electromagnetism*
2	**Electrical Fundamentals–Unit 6** *Uses of Electromagnetism*
3	**Electrical Fundamentals–Unit 7** *The Electrical Circuit*
4	**Electrical Fundamentals–Unit 8** *Math*
5	**Electrical Fundamentals–Unit 9** *Electrical Formulas*
6	**Electrical Fundamentals– Unit 10** *Series Circuits*
7	**Electrical Fundamentals–Unit 11** *Parallel Circuits*
8	**Electrical Fundamentals–Unit 12** *Series-Parallel Circuits*
9	**Electrical Fundamentals–Unit 13** *Multiwire Circuits*
10	**Lab/Activity** *Instructor/Institution Choice*
11	**Flex Training** *Instructor/Institution Choice*
12	**Quarter 2 Review**
13	**Quarter 2 Exam**

LEVEL 1 LESSON PLAN—AT A GLANCE

Session	Quarter 3
1	**Electrical Fundamentals–Unit 14** *The Electrical System*
2	**Electrical Fundamentals–Unit 15** *Protection Devices*
3	**Electrical Fundamentals–Unit 16** *Alternating Current*
4	**Electrical Fundamentals–Unit 17** *Capacitance*
5	**Electrical Fundamentals–Unit 18** *Inductance*
6	**Electrical Fundamentals–Unit 19** *Power Factor and Efficiency*
7	**Electrical Fundamentals–Unit 20** *Motors*
8	**Electrical Fundamentals–Unit 21** *Generators*
9	**Electrical Fundamentals–Unit 22** *Transformers*
10	**Lab/Activity** *Box Fill*
11	**Lab/Activity** *Box Fill*
12	**Quarter 3 Review**
13	**Quarter 3 Exam**

Session	Quarter 4
1	**Introduction to the *NEC*** *How to Use the NEC (Video)*
2	**Apprenticeship Supplement** *Articles 90 and 100*
3	**Apprenticeship Supplement** *Article 110*
4	**AC/DC Fundamentals** *Review*
5	**Apprenticeship Supplement** *Grounding and Bonding*
6	**Apprenticeship Supplement** *Grounding and Bonding*
7	**Apprenticeship Supplement** *Grounding and Bonding*
8	**Lab/Activity** *Conductor Ampacity*
9	**Lab/Activity** *Conductor Ampacity*
10	**Quarter 4 Review**
11	**Quarter 4 Exam**
12	**Level 1 Review**
13	**Level 1 Final Exam**

LEVEL 2 OUTLINE

LEVEL 2 OBJECTIVES

Upon the completion of Level 2, students will possess the knowledge necessary to safely and proficiently perform the job duties and responsibilities expected of a second-year apprentice. The student will develop a further knowledge of construction safety, electrical safety, and chapters one through three of the *National Electrical Code*.

As the student studies rules in the first three chapters of the *NEC* a greater understanding of the purpose of the *Code*'s general wiring methods, materials, and different types of protection along with developing a deeper understanding of residential and commercial wiring systems will be developed.

LEVEL 2 RESOURCES

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Videos

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Textbook Testing. Our textbooks contain tests that have been designed to reinforce the learning process when the Online Testing Tools aren't used. We encourage you to have your students fill in the textbook tests before taking the online tests to further reinforce their learning process.

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  ISBN 978-1-950431-07-6, 2020
- *National Electrical Code, 2020 Edition*
  National Fire Protection Association
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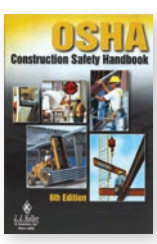

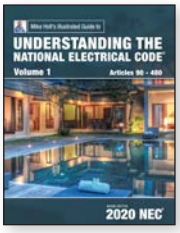

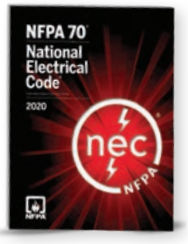

LEVEL 2 LESSON PLAN—AT A GLANCE

Session	Quarter 1
1	**Introduction | Orientation | Tools** *Level 2*
2	**OSHA Construction Safety** *Electrical Safety and PPE*
3	**OSHA Construction Safety** *Confined Space, Emergency Response, and Lockout/Tagout*
4	***NEC*—Article 90** *Introduction*
5	**NEC—Article 100** *Definitions*
6	**NEC—Article 110** *Requirements for Electrical Installations 1*
7	**NEC—Article 110** *Requirements for Electrical Installations 2*
8	***NEC*—Article 200** *Use and Identification of Grounded [Neutral] Conductors*
9	***NEC*—Article 210** *Branch Circuits 1*
10	***NEC*—Article 210** *Branch Circuits 2*
11	***NEC*—Article 210** *Branch Circuits 3*
12	**Quarter 1 Review**
13	**Quarter 1 Exam**

Session	Quarter 2
1	***NEC*—Article 215** *Feeders*
2	***NEC*—Article 220** *Branch-Circuit, Feeder, and Service Calculations 1*
3	***NEC*—Article 220** *Branch-Circuit, Feeder, and Service Calculations 2*
4	***NEC*—Article 225** *Outside Branch Circuits and Feeders*
5	***NEC*—Article 230** *Services 1*
6	***NEC*—Article 230** *Services 2*
7	***NEC*—Article 240** *Overcurrent Protection 1*
8	***NEC*—Article 240** *Overcurrent Protection 2*
9	**Apprenticeship Supplement–Article 250** *Grounding and Bonding*
10	**Lab** *GFCI Devices*
11	**Flex Day** *School/Instructor Choice*
12	**Quarter 2 Review**
13	**Quarter 2 Exam**

LEVEL 2 LESSON PLAN—AT A GLANCE

Session	Quarter 3
1	***NEC*—Article 242** *Surge-Protective Devices (SPDs)*
2	***NEC*—Article 300** *General Requirements for Wiring Methods and Materials 1*
3	***NEC*—Article 300** *General Requirements for Wiring Methods and Materials 2*
4	***NEC*—Article 310** *Conductors for General Wiring 1*
5	***NEC*—Article 310** *Conductors for General Wiring 2*
6	***NEC*—Article 312** *Cabinets, Cutout Boxes, and Meter Socket Enclosures*
7	***NEC*—Article 314** *Outlet, Device, Pull, and Junction Boxes; Conduit Bodies; and Handhole Enclosures 1*
8	***NEC*—Article 314** *Outlet, Device, Pull, and Junction Boxes; Conduit Bodies; and Handhole Enclosures 2*
9	***NEC*—Articles 320 and 330** *Armored Cable (Type AC) and Metal-Clad Cable (Type MC)*
10	**Lab/Activity** *Voltage-Drop Calculations*
11	**Flex Day** *School/Instructor Choice*
12	**Quarter 3 Review**
13	**Quarter 3 Exam**

Session	Quarter 4
1	***NEC*—Articles 334, 336, and 338** *Cables Types NM, NMC, TC, SE, and USE)*
2	***NEC*—Articles 340, 342, and 348** *Cable Type UF, Conduits Types IMC and FMC*
3	***NEC*— Articles 350, 352, and 356** *Conduits Types LFMC, PVC, and LFNC*
4	***NEC*—Articles 344 and 358** *Conduits Types RMC and EMT*
5	***NEC*—Articles 362 and 376** *Conduit Type ENT and Metal Wireways*
6	***NEC*—Articles 380, 386, and 392** *Multioutlet Assemblies, Surface Metal Raceways, and Cable Trays*
7	**Lab/Activity** *Conduit Bending*
8	**Lab/Activity** *Raceway Sizing Calculations*
9	**Flex Training** *Institution/Instructor Choice*
10	**Quarter 4 Review**
11	**Quarter 4 Exam**
12	**Level 2 Review**
13	**Level 2 Final Exam**

LEVEL 3 OUTLINE

LEVEL 3 OBJECTIVES

Upon the completion of Level 3, students will possess the knowledge necessary to safely and proficiently perform the job duties and responsibilities expected of a third-year apprentice. The student will continue building a foundation of knowledge about construction safety, electrical safety, and the *National Electrical Code*.

LEVEL 3 RESOURCES

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Videos

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  Mike Holt Enterprises
  ISBN 978-1-950431-07-6, 2020
- *Mike Holt's Understanding NEC Requirements for Bonding and Grounding*
  Mike Holt Enterprises
  ISBN 978-1-950431-03-8, 2020
- *Mike Holt's Understanding the National Electrical Code, Volume 2*
  Mike Holt Enterprises
  ISBN 978-1-950431-08-3, 2020
- *OSHA Construction Safety Training Handbook, 6th Edition*
  J.J. Keller & Associates,
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- *Mike Holt's Understanding NEC Requirements for Solar Photovoltaic (PV) and Energy Storage Systems*
  Mike Holt Enterprises
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- *Mike Holt's Understanding Basic Motor Controls*
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  ISBN 978-0-9992038-4-2, Revised Edition
- *National Electrical Code, 2020 Edition*
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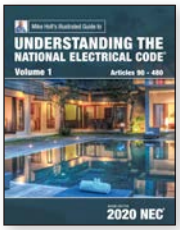
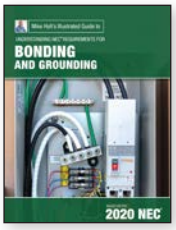
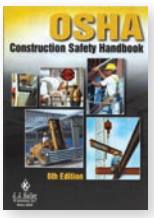
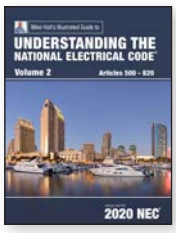
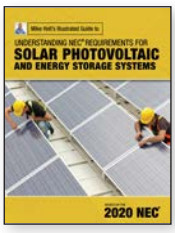
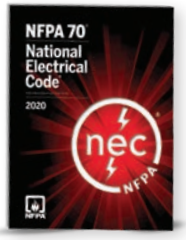












LEVEL 3 LESSON PLAN—AT A GLANCE

Session	Quarter 1
1	**Introduction | Orientation | Tools** *Level 3*
2	**OSHA Construction Safety** *Electrical Safety and PPE*
3	**OSHA Construction Safety** *Excavation/Motor Vehicles/Tool Safety*
4	***NEC*—Articles 400 and 402** *Flexible Cords and Cables, and Fixture Wires*
5	***NEC*—Articles 404 and 406** *Switches and Receptacles*
6	***NEC*—Article 408** *Switchboards, Switchgear, and Panelboards*
7	***NEC*—Articles 410 and 411** *Luminaires and Low-Voltage Lighting Systems*
8	***NEC*—Article 422** *Appliances*
9	***NEC*—Article 424** *Fixed Electric Space-Heating Equipment*
10	***NEC*—Article 430** *Motors, Motor Circuits, and Controllers 1*
11	***NEC*—Article 430** *Motors, Motor Circuits, and Controllers 2*
12	**Quarter 1 Review**
13	**Quarter 1 Exam**

Session	Quarter 2
1	**Lab/Activity** *Lighting–Ballasts and Transformers*
2	***NEC*–Articles 440, 445, and 450** *Air-Conditioning/Refrigeration Equipment and Transformers*
3	**Bonding and Grounding–Fundamentals** *Units 1, 2, 3, and 4*
4	**Bonding and Grounding–*NEC*** *Articles, 90, 100, and 110*
5	**Bonding and Grounding–NEC** *Article 250*
6	**Bonding and Grounding–NEC** *Article 250*
7	**Bonding and Grounding–NEC** *Article 250*
8	***NEC*–Articles 500-503, 511, and 514** *Hazardous Locations, Commercial Garages, and Motor Fuel Dispensing*
9	***NEC*–Articles 517, 518, 550, and 590** *Health Care Facilities, Assembly Occupancies, Mobile/Manufactured Homes, and Temporary Installations*
10	***NEC*–Articles 600, 604, and 620** *Electric Signs, Manufactured Wiring Systems, and Elevators*
11	**Flex Training** *Institution/Instructor Choice*
12	**Quarter 2 Review**
13	**Quarter 2 Exam**

LEVEL 3 LESSON PLAN—AT A GLANCE

Session	Quarter 3
1	***NEC*—Articles 625 and 630** *Electric Vehicle Charging System and Electric Welders*
2	***NEC*—Articles 640 and 645** *Audio Signal Processing and Information Technology Equipment*
3	***NEC*—Article 680** *Swimming Pools, Spas, Hot Tubs, Fountains, and Similar Installations*
4	***NEC*—Articles 700, 701, and 702** *Emergency, Legally Required, and Optional Standby Systems*
5	***NEC*—Article 725** *Remote-Control, Signaling, and Power-Limited Circuits*
6	***NEC*—Articles 760, 770, 800, 810, and 820** *Fire Alarm Systems, Optical Fiber Cables and Raceways, Communications Circuits, Radio and Television Equipment, and CATV and Radio Distribution Systems.*
7	***NEC*—Article 690** *Solar Photovoltaic (PV) Systems 1*
8	***NEC*—Article 690** *Solar Photovoltaic (PV) Systems 2*
9	***NEC*—Articles 480, 691, and 705** *Storage Batteries, Large-Scale Solar Photovoltaic (PV) Electric Supply Stations, and Interconnected Electric Power Production Sources (IEPPS)*
10	***NEC*—Articles 705 and 706** *Interconnected Electric Power Production Sources (IEPPS) and Energy Storage Systems*
11	***NEC*—Articles 706 and 710** *Energy Storage and Stand-Alone Systems*
12	**Quarter 3 Review**
13	**Quarter 3 Exam**

Session	Quarter 4
1	**Motor Controls–Units 1–3** *Introduction to Motor Controls*
2	**Motor Controls– Units 4–8** *Motor Controls and Schematics 1*
3	**Motor Controls–Units 9–10** *Motor Controls and Schematics 2*
4	**Motor Controls– Units 11–12** *Reversing Controls 1*
5	**Motor Controls–Units 13–14** *Reversing Controls 2*
6	**Motor Controls–Units 15–16** *Controls for Multiple Motors*
7	**Motor Controls–Units 17–20** *Miscellaneous Requirements*
8	**Lab/Activity** *Variable Speed Drives*
9	**Flex Day** *School/Instructor Choice*
10	**Quarter 4 Review**
11	**Quarter 4 Exam**
12	**Level 3 Review**
13	**Level 3 Final Exam**

LEVEL 4 OUTLINE

LEVEL 4 OBJECTIVES

Upon the completion of Level 4, students will possess the knowledge necessary to safely and proficiently perform the job duties and responsibilities expected of a Journeyman Electrician. They'll develop a further knowledge of construction safety, electrical safety, the *NEC in preparation for their* exam. Your students will also gain an understanding of some basic leadership principals necessary to excel on the job and be introduced to fire alarm system basics.

LEVEL 4 RESOURCES

Mike Holt's Apprenticeship Training Program is designed to use textbooks, PowerPoint® presentations, videos, labs/activities, review questions, and exams designed to enhance learning, comprehension, and retention of the material presented.

Videos

The instruction package includes videos that can played along with the textbook(s) (or viewed in their entirety) to provide a practical viewpoint of the material being (or to be) covered. If something isn't understood or misinterpreted, stop, go back, and play that section again until the topic being discussed is clear.

Mike and a panel of industry experts are featured on these videos. They carefully examine the topics in a way that's both educational and entertaining. You'll hear stories, discussions, and that opinions aren't covered in the textbooks thereby making them an invaluable practical source of information.

PowerPoint® Presentations

Also included in this instruction package are PowerPoint® presentations containing hundreds of slides that are synchronized with the textbook(s). These presentations are sorted by individual article or unit resulting in much smaller, less cumbersome files and make it easier to follow along side-by-side with the textbook.

Labs/Activities

One of the most enjoyable parts of learning is getting your hands on mechanical parts such as, meters, wire, magnets, coils, light bulbs, switches, fuses, circuit breakers, receptacles, GFCIs, AFCIs, and basically anything that can be broken!

We strongly suggest you find or create labs that match the topic being studied as a hands-on experience to help students understand the material being taught. Seeing a mechanical concept in action makes it easier to understand the lesson being taught.

Testing

Testing is an important aspect of the learning process. Studies have shown that students who are required to mentally recall a subject on a test are more likely to remember the content than those who didn't have this opportunity. Our program includes different options for testing: online, textbook, and ExamView test banks.

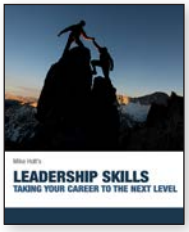
Textbook Testing. Our textbooks contain tests that have been designed to reinforce the learning process for the content covered. We encourage you to have your students complete the textbook tests before taking the online tests.

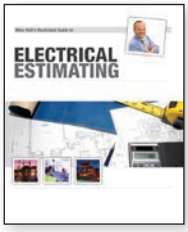
Online Testing. Our online testing program has been specifically designed to allow you to take advantage of today's blended learning environments to reinforce the material that's been covered.

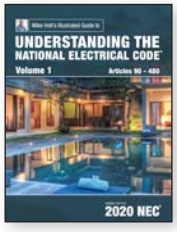
Books

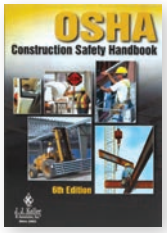
You'll be using the following books or textbooks and we suggest you take a few moments to review the layout of each. Pay attention to the table of contents, the layout of the units/chapters, and the review questions.

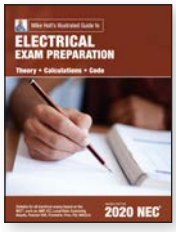
- *Mike Holt's Guide to Electrical Estimating, 2nd Edition*
  Mike Holt Enterprises
  ISBN 978-1-932685-50-3, 2012
- *Mike Holt's Leadership Skills*
  Mike Holt Enterprises
  ISBN 978-0-9975452-2-7, 2016
- *Mike Holt's Understanding the National Electrical Code, Volume 1*
  Mike Holt Enterprises
  ISBN 978-1-950431-07-6, 2020
- *OSHA Construction Safety Training Handbook, 6th Edition*
  J.J. Keller & Associates,
  ISBN 978-1-60287-891-4, 2010
- *Mike Holt's Guide to Electrical Exam Preparation*
  Mike Holt Enterprises
  ISBN 978-0-9992038-7-3, 2020
- *Mike Holt's Journeyman Practice Exam*
  Mike Holt Enterprises
  ISBN 978-0-9992038-8-0, 2020
- *National Electrical Code, 2020 Edition*
  National Fire Protection Association
  ISBN 978-145592297-0, 2019

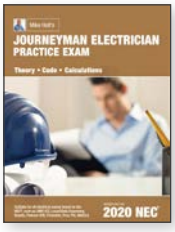


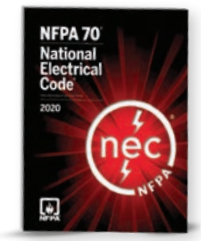












LEVEL 4 LESSON PLAN—AT A GLANCE

Session	Quarter 1
1	**Introduction | Orientation | Tools** *Level 4*
2	**OSHA Construction Safety** *Electrical Safety and PPE*
3	**OSHA Construction Safety** *Hazard Communication/Jobsite Exposures/ Work Zone Safety*
4	**Electrical Estimating–Chapters 1 and 2** *Introduction and About Estimating*
5	**Electrical Estimating–Chapter 3** *Understanding Labor Units*
6	**Electrical Estimating–Chapter 4** *The Estimating Process*
7	**Electrical Estimating–Chapter 5** *Determining Break-Even Cost*
8	**Electrical Estimating–Chapters 6 and 7** *The Bid Process and Unit Pricing*
9	**Lab/Activity** *Blueprint Takeoff*
10	**Leadership Training, Part 1** *Leadership Skills*
11	**Leadership Training, Part 2** *Leadership Skills*
12	**Quarter 1 Review**
13	**Quarter 1 Exam**

Session	Quarter 2
1	***Code* Review** *Articles 90 through 110 and 200 through 240*
2	***Code* Review** *Articles 300 through 314*
3	***Code* Review** *Articles 400 through 480*
4	**Fundamentals Review–Unit 1** *Electrician's Math and Basic Electrical Formulas*
5	**Fundamentals Review–Unit 2** *Series, Parallel, and Multiwire Circuits*
6	**Fundamentals Review–Unit 3** *Understanding Alternating Current*
7	**Fundamentals Review–Unit 4** *Motor Basics*
8	**Fundamentals Review–Unit 4** *Transformers*
9	**Fundamentals Final Review** *Units 1–4*
10	**Flex Training** *Institution/Instructor Choice*
11	***NEC* Calculations** *Raceway and Box Calculations*
12	**Quarter 2 Review**
13	**Quarter 2 Exam**

LEVEL 4 LESSON PLAN—AT A GLANCE

Session	Quarter 3
1	***NEC*** **Calculations–Unit 6, Part A** *Conductor Sizing and Protection Calculations 1*
2	***NEC*** **Calculations–Unit 6, Part B** *Conductor Sizing and Protection Calculations 2*
3	***NEC*** **Calculations–Unit 7, Parts A and B** *Motor and Air-Conditioning Calculations 1*
4	***NEC*** **Calculations–Unit 7, Parts B and C** *Air-Conditioning Calculations–Transformers 2*
5	***NEC*** **Calculations–Unit 8, Parts A and B** *Voltage-Drop Calculations*
6	***NEC*** **Calculations–Unit 9, Parts A and B** *Dwelling Unit Calculations 1*
7	***NEC*** **Calculations–Unit 9, Parts B and C** *Dwelling Unit Calculations 2*
8	**Lab/Activity** *Dwelling Unit Calculations*
9	***NEC*** **Calculations–Unit 10, Parts A and B** *Multifamily Dwelling Calculations 1*
10	***NEC*** **Calculations–Unit 10 Parts B and C** *Multifamily Dwelling Calculations 2*
11	**Lab/Activity** *Fire Alarm Systems*
12	**Quarter 3 Review**
13	**Quarter 3 Exam**

Session	Quarter 4
1	***NEC*** **Calculations–Unit 11, Parts A and B** *Commercial Calculations 1*
2	***NEC*** **Calculations–Unit 11, Parts B and C** *Commercial Calculations 2*
3	***NEC*** **Practice Quiz 16** *Sections 90.1–680.25*
4	***NEC*** **Practice Quiz 17** *Sections 680.26–701.12*
5	**OSHA Construction Safety Handbook** *Review safety rules and practices*
6	**Electrical Theory** *Review Unit Summaries*
7	**Level 4 Final Exam Part 1** *Journeyman Practice Exam, Electrical Theory*
8	**National Electrical *Code*** *Review*
9	**Level 4 Final Exam Part 2** *Journeyman Practice Exam, National Electrical Code*
10	**Electrical Calculations** *Review*
11	**Level 4 Final Exam Part 3** *Journeyman Practice Exam, Electrical Calculations*
12	**Final Exam** *Review Test Results and Questions*
13	**Final Processing, Graduation Documents**