NCCER’s catalog is going digital!

In an effort to keep information updated more frequently, the NCCER Curriculum Catalog will be exclusively available online starting in 2020. Craft listings with modules for each level will still be available as downloadable PDFs on each of the individual craft webpages, found at www.nccer.org/crafts. A compiled PDF of all crafts will also be available on the Instructor Portal at www.nccer.org/instructors.

Stay up-to-date with all NCCER news by scanning the QR code below or signing up for our mailing list at www.nccer.org/join-mailing-list

Check pages 2-3 for ordering information.

Pearson Education Directors’ contact information can be found on page 4.
# Table of Contents

## Ordering and Customer Service
- Ordering and Customer Service .................................................. 2
- Pearson Contact Information ......................................................... 4

## About NCCER
- Letter from the Chairman of the Board .............................................. 5
- Subject Matter Expert Thank You ....................................................... 6
- Now Available .................................................................................. 7
- The NCCER Program ........................................................................ 8
- Assessments and Certification ............................................................. 9
- Instructor Resources ......................................................................... 10
- NCCERconnect ................................................................................ 11
- NCCER’s Expanded Digital & Customer Service Offerings .................. 12
- Module and Craft Identification Numbers ......................................... 13

## Construction Essentials
- Applied Construction Math ............................................................... 14
- Core Curriculum ................................................................................. 14
- Tools for Success ................................................................................ 15

## Construction & Maintenance
- Boilermaking .................................................................................... 15
- Cabinetmaking .................................................................................. 19
- Carpentry ............................................................................................ 17
- Concrete Finishing .............................................................................. 19
- Construction Craft Laborer ................................................................. 20
- Construction Technology .................................................................... 21
- Drywall ............................................................................................... 21
- Electrical ............................................................................................ 22
- Electronic Systems Technician ............................................................ 24
- From the Ground Up .......................................................................... 19
- Green Topics in HVAC ...................................................................... 31, 66
- Heavy Equipment Operations ............................................................. 27
- Heavy Highway Construction ............................................................. 28
- HVAC ................................................................................................. 29
- Hydroblasting .................................................................................... 29
- Industrial Coating and Lining Application Specialist ......................... 32
- Industrial Maintenance Electrical & Instrumentation ......................... 33
- Industrial Maintenance Mechanic ...................................................... 35
- Instrumentation .................................................................................. 37
- Ironworking ....................................................................................... 39
- Managing Electrical Hazards ............................................................... 24, 91
- Masonry ............................................................................................. 41
- Mechanical Insulating ....................................................................... 42
- Millwright .......................................................................................... 43
- Painting ............................................................................................... 46
- Pipelining .......................................................................................... 47
- Pipelayer ............................................................................................ 49
- Plumbing ........................................................................................... 50
- Reinforcing Ironwork ........................................................................ 52
- Scaffolding ......................................................................................... 53
- Sheet Metal ......................................................................................... 53
- Site Layout ........................................................................................ 55

## Crane, Rigger, and Signal Person
- Mobile Crane Operations .................................................................. 60
- Rigger/Signal Person .......................................................................... 61
- Tower Crane Operator ....................................................................... 62

## Green/Sustainable
- Alternative Energy ............................................................................. 62
- Solar Photovoltaics ........................................................................... 63
- Sustainable Construction Supervisor ................................................ 63
- Weatherization .................................................................................. 64
- Wind Energy ...................................................................................... 65
- Your Role in the Green Environment ................................................ 15, 63

## Management
- Fundamentals of Crew Leadership .................................................... 67
- Project Management .......................................................................... 68
- Project Supervision ............................................................................ 67

## Maritime
- Maritime Industry Fundamentals ....................................................... 69
- Maritime Pipelining ............................................................................ 69
- Maritime Structural Fitter ................................................................. 70

## Pipeline
- Introduction to the Pipeline Industry .................................................. 74
- Pipeline Abnormal Operating Conditions ........................................ 74
- Pipeline Career Pathway Training ..................................................... 72
- Pipeline Corrosion Control ................................................................. 80
- Pipeline Covered Tasks ..................................................................... 71
- Pipeline Electrical and Instrumentation ............................................. 75
- Pipeline Field and Control Center Operations ................................. 79
- Pipeline Maintenance and Mechanical ............................................. 76
- Pipeline Program .............................................................................. 71

## Power
- Power Generation Maintenance Electrician ..................................... 82
- Power Generation I&C Maintenance Technician ............................... 84
- Power Generation Maintenance Mechanic ....................................... 86
- Power Industry Fundamentals .......................................................... 82
- Power Line Worker ........................................................................... 88
- Power Line Worker: Distribution ....................................................... 88
- Power Line Worker: Substation ......................................................... 89
- Power Line Worker: Transmission ..................................................... 90

## Safety
- Basic Safety (Construction Site Safety Orientation) ......................... 14, 91
- Fall Protection Orientation ................................................................. 91
- Field Safety ....................................................................................... 91
- Horizontal Directional Drilling Hazards ........................................... 49, 91
- Safety Technology .............................................................................. 92
## HOW TO ORDER

### Order Books
- **K-12 (secondary) organization**
  - Returning customer?
    - Yes.
    - No, I’m a new customer.
- **Other organizations: industry, college or government**
  - Returning customer?
    - Yes.
    - No, I’m a new customer.

### NCCERconnect Access
- Returning customer?
  - Yes.
  - I need course details.
  - I need help getting started.
  - No, I’m a new customer.
  - Have an access code?
    - I have an access code.
    - I need an access code.

### Custom Books
- Returning customer?
  - Yes.
  - Do you have a custom book ISBN?
    - Yes.
    - No.
  - No, I’m a new customer.
    - Contact your Pearson/NCCER executive director.

### Desk copy or general questions about product
- Contact your Pearson/NCCER executive director.

### Instructor Resources
- Have an access code?
  - Yes.
  - Visit www.nccer.org/irc and proceed to download your resources. You will have an option to enter your access code and create an account after you select the resources you want to download.
  - No.
  - Visit www.nccer.org/irc and proceed to download your resources. When promoted to login you will have an option to request an access code that will enable you to create a username and password.

### Additional FAQs:
- **Pipeline ordering information:** Visit ncerc.org/pipeline-program. Refer to pages 73-83 for ISBNs, content information and pricing.
Ordering and Customer Service

Module Orders
Individual modules are printed on demand. Please allow two to three weeks for fulfillment and delivery. Modules are not returnable.

Pricing
All prices listed in this catalog reflect net pricing available to schools, government, business and industry accounts. No additional discounts are available. Prices are subject to change without notice.

Shipping and Postage
Shipping costs are based on a number of factors including weight, destination and type of service. All orders are subject to approximately 8%-10% shipping cost on total order. State and local taxes will be added where they apply.

Billing
Invoices are generated only after items have shipped. You may receive multiple invoices on one purchase order if items are backordered and/or not yet published. Drop shipments to other locations are accompanied by a packing slip. This is not an invoice and should not be paid. Only the “Bill to” account will be invoiced.

Returns Policy
If you are not entirely satisfied with any of our textbooks, you may return materials including paperback, loose-leaf and binder in salable condition for a full refund, credit or replacement within 15 months of the original invoice date (12 months for high school accounts). All packages must be returned complete as sold. Individual modules are printed on demand.

Payment Terms
Net 30 days.

Individual Ordering Information
Orders from individuals are welcome but must be prepaid by credit card (VISA, MasterCard and Discover accepted), check or money order. Individual pricing is list price, not reflected in this catalog. Individual Ordering Department: 800-947-7700

Check out the online catalog at www.nccer.org/bookstore

Pearson Credit Department
For payment inquiries call: 800-634-2863

Pearson Tech Support
800-677-6337

International Orders
Phone: 800-635-3889
Email: intlcs@pearsoned.com

Visit nccerconnect.com and sign in. Click the gear button on your active courses to get course details.

Visit nccerconnect.com and click the Get Support button located in the light green bar.

Visit nccerconnect.com and click register.

Contact your Pearson/NCCER executive director.

See orange section above for ordering information, you will need to provide the custom book ISBN.

Visit pearsonhighered.com/collections to create a custom book. A custom book ISBN will be created and sent to you via email within 48-72 hours of creating your book.
With many years of experience in leadership and management in our industry, I have found that having highly skilled employees on the job is a leading indicator of proactive and productive contractors. The craft training and assessments developed by NCCER have made a significant impact on getting craft professionals trained and ensuring the workforce is safe and sustainable.

Modernizing training delivery processes has allowed NCCER to continue developing curricula more quickly and efficiently. All four levels of Pipefitting have been revised together for the first time and are set for a summer release. In addition, Project Management has been updated and will be released this year.

With over half of construction managers estimated to retire by 2026, it is critical that the industry provides training and credentials for our front-line superintendents. Accordingly, NCCER and FMI are now offering a joint certification for qualified professionals in the superintendent field. Find more information about the Construction Superintendent Certification Program at nccer.org/super.

The online testing system has been expanded to include all NCCER craft and pipeline tests, making module testing easier than ever. Hitting an all time high of 900 tests processed in one hour, this system allows instructors to spend more time building skills and hands-on competency while saving organizations 87 percent in test administration costs.

NCCER remains committed to providing innovative workforce development solutions that assist the industry in building a steady pipeline of skilled craft professionals. This organization stands out as one of the best investments in building a productive and sustainable workforce, and I look forward to serving as the 2019 NCCER Chairman of the Board of Trustees.

Andy Dupuy
Chief Executive Officer of Brown & Root
2019 Chairman of the NCCER Board of Trustees
NCCER would like to thank the Subject Matter Experts from the following companies who provided their expertise and assistance in developing and revising this year’s curricula.

ABC National
ABC Pelican Chapter
AGC
AGC New Mexico
AGC of Oklahoma
Alaska Training Center
Austral USA
Bay Ltd.
Bechtel
Bollinger Shipyards
Bo-Mac Contractors, Ltd.
Builders Association of North Central Florida
CareerSafety Center
Carolina Bridge Company
Center for Employment Training
Cianbro Companies
CITC Washington
Continental Maritime
Cowboyscranes.com
Crane Industry Services
Crossland Construction
Duke Energy
Exelon Generation
Fluor
Fort Scott Community College
Greater Baton Rouge Industry Alliance (GBRIA)
Hubbard Construction
Industrial Management and Training Institute, Inc.

Ingalls Shipbuilding
Jacobs Field Services
KBR, Inc.
Kelley Construction
Lee Company
Lincoln Tech
LPR Construction Company
Mammoet USA
MasTec
McAllen Careers Institute
North American Crane Bureau
Northern Industrial Training
Orion Marine Group
Safety Advantage, LLC
Safety Council of Texas City
Santa Fe College
Southland Safety, LLC
STARCON International, Inc.
Sundt Construction, Inc.
Tampa Electric Company
Técnico Corporation
The Haskell Company
TIC – The Industrial Company
Tri-City Electrical Contractors
Turner Industries Group, LLC
Vigor
Wayne J Griffin Electric, Inc.
Windham School District
The need for experienced front-line superintendents and management is only growing with more than half of the management workforce estimated to retire by 2026.

**NCCER has released a new superintendent assessment.** This assessment can be aligned to various front-line management training programs and successful completions result in a knowledge verified credential. In addition, NCCER is partnering with FMI® to offer a joint certification to qualified professionals in the superintendent field. Find out more at nccer.org/super.

In addition, NCCER offers Construction Workforce Development Professional and Mentoring for Craft Professionals training programs. Both titles were developed by teams of subject matter experts and can be ordered directly from shop.nccer.org.

**Coming Soon in 2019**

- Project Management
- Pipefitting Levels 1-4
- Maritime Electrical Levels 1-4
- Maritime Welding Levels 1-3
- Maritime Welding Aluminum Welding
WHAT IS NCCER?

NCCER is a not-for-profit 501(c)(3) education foundation that was created in 1996 as The National Center for Construction Education and Research. More than 125 construction CEOs and various association and academic leaders united to revolutionize training for the construction industry. Sharing the common goal of developing a safe and productive workforce, these companies created NCCER as a standardized training and credentialing program. NCCER provides a consistent program of accreditation, instructor certification, standardized curricula, assessments and certifications with industry-recognized, globally portable credentials.

WHAT WE OFFER

Accreditation

As the accrediting body for the industry, NCCER establishes the benchmark for quality training and assessments. By partnering with industry and academia, NCCER provides a system for accreditation that is similar to those found in institutions of higher learning. The accreditation process assures that students receive training based on uniform standards and criteria.

NCCER’s instructor certification training program is an integral part of the accreditation process and ensures consistent delivery of training. Through this process, NCCER certifies the Master Trainer, who in turn certifies the local craft instructor. Craft instructors are journey-level craft professionals or career and technical educators who are trained and certified to teach NCCER curricula. There are currently more than 7,000 master trainers and over 72,000 craft instructors within NCCER’s network.

Standardized Curricula

NCCER develops and publishes its curricula in partnership with Pearson, a leading textbook publisher. These competency-based curricula have measurable objectives and are taught by a broad range of accredited NCCER providers worldwide. NCCER uses teams of Subject Matter Experts from contractors and schools to ensure the training curricula meet or exceed industry standards. NCCER curricula meet the Department of Labor’s office in apprenticeship requirements for time-based training and are modular in format, allowing for flexibility and custom task training.

Industry-Recognized Credentials

The NCCER Registry System is a credentialing and certification system that assures portability of skills. It provides transcripts, certificates and wallet cards for individuals who successfully complete any NCCER standardized training program conducted by an NCCER accredited organization. These valuable industry credentials benefit students as they seek employment and build their careers. Over 17 million module completions have been delivered to students and craft professionals internationally.

Image Enhancement and Recruitment

Build Your Future (BYF) is NCCER’s national image enhancement and recruitment initiative for the construction industry. Its mission is to recruit the next generation of craft professionals.

BYF provides a number of resources to assist industry, education and military organizations in recruiting, changing perceptions and providing a path from ambition to training to job placement as a craft professional.

BYF is growing to provide even more material for parents, educators, counselors and other stakeholders in young people’s lives. Check out discover.byf.org — BYF’s new website with facts about careers in construction, steps to get started in the industry, success stories and so much more!

In addition, a full array of resources for classrooms and career days is available at shop.nccer.org.
Assessments

NCCER offers a complete series of journey-level assessments. These assessments evaluate the knowledge and skill level of an individual in a specific craft area. All assessments are based on NCCER curricula and have been developed in conjunction with Prov™, NCCER’s test development partner. An individual’s certification is documented through the NCCER Registry System. For additional assessment information, visit www.nccer.org.

Journey Level
- Boilermaker:
  - Pressure Vessel
- Commercial Carpenter
- Commercial Electrician
- Concrete Finisher*
- Construction Superintendent
- Construction Technologist
- Drywall Mechanic*
- Heavy Equipment Operator:
  - Backhoe
  - Dozer
  - Dump Truck
  - Excavator
  - Forklift
  - Loader
  - Motor Grader
  - Roller
  - Scraper
  - Skid Steer
- HVAC Technician
- Industrial Boilermaker:
  - Maintenance
  - Exchanger
- Industrial Carpenter*
- Industrial Coating and Lining Application Specialist:
  - Level 1
  - Level 2
- Industrial Electrician*
- Industrial Insulator*
- Industrial Ironworker*
- Industrial Maintenance Electrical and Instrumentation Technician
- Industrial Maintenance Mechanic
- Industrial Maintenance Support Mechanic
- Industrial Millwright
- Industrial Painter*
- Industrial Pipefitter*
- Instrumentation Fitter
- Instrument Technician*
- Maritime Structural Fitter
- Masonry
- Plumber
- Power Generation:
  - Maintenance Electrician
  - Maintenance Mechanic
- Power Line Worker:
  - Substation
  - Distribution
  - Transmission
- Reinforcing Ironworker*
- Scaffold Builder*

Management
- Foreman
- Supervisor
- Sustainable Construction Supervisor
- Construction Workforce Development Professional

Other
- Hydroblasting Technician
- Core
- Maritime Core

*These assessments are also available in Spanish.

NCCER certifications for Mobile Crane Operator, Tower Crane Operator, Rigger & Signal Person

NCCER’s certification programs offer:
- Assessment and practical examination results available within 15 minutes of submission
- No rush fees
- Real-time online verification
- Portable, industry-recognized credentials

Find out more at nccer.org/crane.

Mobile Crane Operator
- 13 equipment-specific certifications (including capacity)

Tower Crane Operator
- Three equipment-specific certifications

Rigger
- Three-level certification program

Signal Person
- Certification program

Find out more at nccer.org/crane.
Instructor Resources

Quickly access resources...
The new myNCCER Instructor Portal connects you to the Online Bookstore, Collections, Instructor Resource Center (IRC) and NCCERconnect. Order books, locate your Pearson Executive Director and search craft titles all from one page!

Visit the Instructor Portal at nccer.org/instructors

From the portal...
Check out the new IRC featuring single sign-on with Collections and NCCERconnect as well as easy access to materials such as lesson plans, PowerPoints and more!

Access Instructor Resources at nccer.org/irc

Ready to begin downloading your instructor resources? Click below to find your craft and get started.

Get My Resources
NCCERconnect fosters learning within and beyond the classroom through a media rich eText and a course management system.

Learning no longer needs to take place between the front and back covers of the textbook. Students are online—on their smartphones, tablets and laptops—from the instant they roll out of bed until the minute they turn in each night. Every moment is an opportunity to connect, experience and learn.

Highlights of this fully integrated learning program:

- **Gradebook**: A robust gradebook allows you to see multiple views of your classes’ progress. Completely customizable and exportable, the gradebook can be adapted to meet your specific needs.
- **Multimedia Library**: Students and instructors can quickly search through resources and find supporting media.
- **Pearson eText**: Rich media options let students watch example videos as they read or do homework.
- **Course Management**: A full suite of course management features including email, document uploading, announcements, gradebook and instructor tools.

NCCERconnect is currently available with eText for the following crafts:
- Carpentry
- Construction Technology
- Core Curriculum
- Electrical
- Electronic Systems Technician
- Fundamentals of Crew Leadership
- Heavy Equipment Operator
- HVAC
- Plumbing
- Welding

For the most up-to-date information, including ordering information, visit www.nccer.org/onlinesolutions

Pearson Collections

Select your ideal content, align it with your syllabus, then publish and share with your students.

**Search**: Collections, the Pearson custom library, includes all of our NCCER titles. You can freely mix and match between any craft areas.

**Create**: Select modules from any of our NCCER titles and add them to a customized book that meets your needs.

**Preview**: You can preview your Collection online at any time. Review the content and either make edits yourself or contact our team to help with the changes.

For more information on this service, visit www.nccer.org/collections.
Registry System

NCCER’s Registry System is a secure database maintained by NCCER to help manage an accredited organization’s training and assessment programs. Individuals can also use the Registry to review their credentials. Visit registry.nccer.org to log in and access the features like the easy to use dashboard and real-time records management.

Learn more about your role in the system by signing up for webinars available on nccer.org/registry.

Testing System

Focus more on building skills and less on paperwork with the NCCER Testing System.

Now available with all NCCER craft and pipeline tests, users are able to create, launch, score, store and submit module tests completely through the online system. These improvements have also eliminated the need for paper-based testing and record storage.

Craft and pipeline test packages are available for pre-purchase at a discounted price. Besides providing reduced rates, the packages come with great perks — tests do not expire, can be used across multiple crafts and may be purchased by credit card or purchase order.

Visit nccer.org/testing for more information about online training resources and to sign up for a free training webinar!

Even more on nccer.org...

NCCER’s website is a great resource for exploring available craft areas, learning more about credentials and finding NCCER accredited training and assessment programs all over the world.

The myNCCER button on the top right leads to a special dashboard for sponsor representatives, master trainers, craft instructors and anyone looking for more in-depth information on NCCER’s programs, systems and resources.
Module and Craft Identification Numbers

Product Design and Supplements

Each craft area comprises successive levels, and each level comprises individual units of study called modules. Modules can be treated as separate task-training units because each one contains objectives as well as knowledge and performance tests. Instructors may teach a single module or the entire craft level and then customize their own training programs by combining modules across various craft areas. Customization is easy and cost-effective.

Course Planning Tools

The following product supplements are available at no cost in the Program Resources - Crafts/Titles section at www.nccer.org:

- Competencies/Objective Lists — Includes all competencies and comprehensive learning objectives for each craft.
- Performance Profiles — Correlates to the performance tasks of NCCER curricula and can be used to provide record keeping where documentation of training is required.
- Equipment and Material Lists — Includes all of the equipment and materials required to teach each module.
- Course Maps — Tracks revised modules, records new module numbers and shows how modules may have been incorporated into revisions or indicates if they have been deleted.

Module ID Numbers

NCCER is excited to continue embarking on our digital move by enhancing our curricula development process to provide faster updates and diverse delivery methods.

Quicker Curriculum Updates

Moving forward, modules will be updated individually instead of entire craft levels revised at once. This allows NCCER to provide you with current industry practices and content updates more frequently as we focus our production efforts on only the modules that have changed. This new process will help ensure that all crafts have the most recent information available.

No Expirations, No Editions

As a result of this, modules without date suffixes will not expire. Expiration dates and edition numbers will be removed from all NCCER modules and levels. In coming years, print books will still be available, but all content will also be offered online and accessible on mobile devices. For more information, visit nccer.org/digital-move.

The two-digit prefix (29) indicates the craft identifier (Welding).

The three digits before the hyphen are unique module identifiers.

The two-digit suffix (15) previously indicating the year of publication will be removed.

Craft Identifiers

The first two digits of the Module Identification Number indicate the “parent” or source craft of that module. All NCCER Craft Identifiers are listed below.

- Alternative Energy .................. 74
- Boilermaking ........................................... 34
- Carpentry ............................................. 27
- Concrete Finishing .................... 23
- Construction Craft Laborer ............. 35
- Construction Technology ............. 68
- Control Center Abnormal Operating Conditions .................. 71
- Core Curriculum .............................. 00
- Drywall .............................................. 45
- Electrical ............................................. 26
- Electronic Systems Technician ......... 33
- Field Abnormal Operating Conditions ... 71
- Fundamentals of Crew Leadership .... 46
- Green/Sustainable Construction ....... 70
- Heavy Equipment Operations .......... 22
- Heavy Highway Construction .......... 36
- HVAC ................................................ 03
- Hydroblasting ................................. 43
- Industrial Coatings .......................... 69
- Industrial Maintenance Mechanic .... 32
- Industrial Maintenance E & I ............. 40
- Instrumentation ............................... 12
- Ironworking ..................................... 30
- Maritime Industry Fundamentals ....... 84
- Maritime Pipelining ......................... 85
- Maritime Structural Fitter ............... 86
- Masonry ............................................. 28
- Mechanical Insulating ..................... 19
- Millwright ......................................... 15
- Mobile Crane Operations ................. 21
- Painting (Commercial/Residential) ... 07
- Pipefitters ....................................... 08
- Pipelayer .......................................... 24
- Pipeline Abnormal Operating Conditions .............. 71
- Pipeline Control Center Operations .... 65
- Pipeline Core .................................... 66
- Pipeline Corrosion Control ............... 61
- Pipeline Electrical & instrumentation ... 64
- Pipeline Field Operations, Gas ........ 67
- Pipeline Field Operations, Liquid ..... 60
- Pipeline Maintenance ..................... 62
- Pipeline Mechanical ....................... 63
- Power Industry Fundamentals .......... 49
- Power Generation Maintenance Electrician .......................... 50
- Power Generation &Transmission Technician ................................ 51
- Power Generation Maintenance Mechanic ................................ 52
- Power Line Worker Level One .......... 49
- Power Line Worker: Distribution ....... 80
- Power Line Worker: Substation .......... 82
- Power Line Worker: Transmission ...... 81
- Plumbing .......................................... 02
- Project Management ....................... 44
- Project Supervision ......................... MT200
- Reinforcing Ironwork ..................... 39
- Rigging ............................................. 38
- Safety ............................................. 75
- Scaffolding ...................................... 31
- Sheet Metal ....................................... 04
- Signal Person .................................... 53
- Site Layout ....................................... 78
- Solar Photovoltaic Installation ........ 57
- Sprinkler Fitting .............................. 18
- Tower Crane ...................................... 48
- Weatherization ................................ 59
- Welding ............................................. 29
- Wind Turbine Maintenance Technician ................................ 58
Introduction to Hand Tools (10 Hours)
(Module ID 00103-15) Introduces common hand tools used in a variety of construction crafts. Identifies tools and how to safely use them. Also presents proper hand tool maintenance.

Introduction to Power Tools (10 Hours)
(Module ID 00104-15) Identifies and describes the operation of many power tools common in the construction environment. Provides instruction on proper use, as well as safe-handling guidelines and basic maintenance.

Introduction to Construction Drawings (10 Hours)
(Module ID 00105-15) Introduces the basic terms, components, and symbols of construction drawings, as well as the most common drawing types. Also covers the interpretation and use of drawing dimensions.

Introduction to Basic Rigging (7.5 Elective Hours)
(Module ID 00106-15) Provides basic information related to rigging and rigging hardware, such as slings, rigging hitches, and hoists. Emphasizes safe working habits in the vicinity of rigging operations.

Basic Communication Skills (7.5 Hours)
(Module ID 00107-15) Provides techniques for effective communication on the job. Includes examples that emphasize the importance of both written and verbal communication skills. Describes the importance of reading skills in the construction industry and discusses effective telephone and email communication skills.

Basic Employability Skills (7.5 Hours)
(Module ID 00108-15) Describes the opportunities offered by the construction trades. Discusses critical thinking and essential problem-solving skills. Also identifies and discusses positive social skills and presents information on computer systems and their industry applications.

Introduction to Material Handling (5 Hours)
Trainee S20 ISBN 978-0-13-412892-4
(Module ID 00109-15) Describes the hazards associated with handling materials and provides techniques to avoid both injury and property damage. Also introduces common material-handling equipment.
Core Curriculum (continued)

Tools for Success

Critical Skills for the Construction Industry

Revised: 2009, Third Edition

PAPERBACK
ISBN
Trainee Workbook: $32
978-0-13-610649-4

This workbook is designed for employees entering the construction industry and has been reviewed and updated with input from construction and training professionals. The Instructor’s Handbook includes an annotated instructor’s outline, recommended teaching schedules, answers to quizzes, and tips and ideas for enhancing class activities.

Boilermaking

Boilermaking Tools

ISO 8578-1:2009
(15 Hours)
Trainee $20
Trainee Guide: $32

This module introduces the hand and power tools used by boilermakers, and the associated safety concerns.

Boilermaking Safety

(12.5 Hours)
Trainee $20
ISBN 978-0-13-213705-8

This module provides an overview of the boilermaker trainee, and the associated safety concerns.

Basic Materials

(10 Hours)
Trainee $20

This module introduces the materials used in the construction of boilers, including material properties, standards and codes, and material markings.

Oxyfuel Cutting

(17.5 Hours)
Trainee $20

This module explains the safety requirements associated with oxyfuel cutting. Describes straight line, bevel, piercing, and washing techniques.

Cutting and Fitting Gaskets

(12.5 Hours)
Trainee $20
ISBN 978-0-13-213699-0

This module describes gasket materials used in mating flanges and procedures for laying out and cutting a flange gasket.

Base Metal Preparation

(10 Hours)
Trainee $20

This module describes how to clean and prepare base metals for cutting and welding.

Welding Basics

(22.5 Hours)
Trainee $20
ISBN 978-0-13-213701-0

This module describes welding and cutting processes and related equipment. Includes filler metals, joint design, and the codes that govern welding practices.

Identifying and Installing Valves

(20 Hours)
Trainee $20

This module identifies valves found in boiler systems. Describes valve components and explains their functions. Explains how to select, store, handle, and install valves, and describes valve markings and nameplate information.

Fasteners and Anchors

(5 Hours)
Trainee $20

This module covers threaded and non-threaded fasteners and anchoring devices. Explains how to select fasteners and anchors for given applications. Describes how to install threaded, non-threaded, and insulated fasteners and anchors.

Your Role in the Green Environment

15 Hours
Updated: 2015, Third Edition
Module ID 70101-15

PAPERBACK
ISBN
Trainee Guide: $30
978-0-13-294863-0

Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

See p. 63 for more information
Boiler Pressure Components (5 Hours)
(Module ID 34302-11) Describes the pressure components of a boiler system and their locations. Explains the procedures required to repair nonpressure components of a boiler.

Boiler Auxiliaries (25 Hours)
(Module ID 34306-11) Describes the airflow systems within a boiler system and the different fuels used to fire boiler system furnaces. Describes ash removal systems and the equipment used to protect the environment. Covers the feed water system into a boiler and the blow down from a boiler system.

Brick, Refractory, Insulation, and Lagging (BRIL) (5 Hours)
(Module ID 34305-11) Describes types of BRIL and explains their functions. Also addresses hazards associated with BRIL.

Advanced Tube Work (20 Hours)
Trainee S20 ISBN 978-0-13-266360-1
(Module ID 34303-11) Explains the methods used to identify problem tubes and extract them. Also describes the methods used for replacing and plugging tubes.

Testing Piping Systems and Equipment (20 Hours)
(Module ID 34308-11) Lists pretest requirements for boiler system piping systems and equipment. Describes service and flow tests, head pressure tests, and hydrostatic tests performed on boiler system piping systems and equipment.

Rigging (22.5 Hours)
(Module ID 15206-07; from Millwright Level Two)
Advanced Tube Work (20 Hours)
Trainee S20 ISBN 978-0-13-266360-1
(Module ID 34303-11) Explains the methods used to identify problem tubes and extract them. Also describes the methods used for replacing and plugging tubes.

Towers and Exchangers (25 Hours)
(Module ID 34307-11) Explains the functions of towers and exchangers and the basic distillation process. Describes various types of towers and exchangers and their components.

Advanced Rigging (20 Hours)
Trainee S20 ISBN 978-0-13-292237-1
(Module ID 34410-12) Explains how to determine the center of gravity for objects to be rigged and how a load’s weight and center of gravity affect lifting devices such as cranes. Describes how to use cribbing to support lifted loads. Covers the use of slings and spreader or equalizer bars to lift loads. Describes the tools used to move loads laterally. Explains how to determine the center of gravity of asymmetrical loads.

Advanced Boilermaking Construction Drawings (20 Hours)
Trainee S20 ISBN 978-0-13-292238-8
(Module ID 34402-12) Covers symbols and abbreviations used on piping and instrumentation drawings and piping arrangement drawings. Explains how to read and interpret different types of construction drawings. Explains how to sketch an isometric drawing from a plan view drawing, and how to calculate line lengths from isometric drawings.

Advanced Pipe Fabrication (50 Hours)
Trainee S20 ISBN 08402-07; from Pipelifting Level Four

Stress Relieving (10 Hours)
(Module ID 34406-12) Covers metal distortion and ways to prevent it. Explains thermal growth in metals, and how to calculate thermal growth in given metals. Explains how misalignment creates stress in metals. Describes ways to relieve stress in piping that is experiencing distortion due to welding, thermal growth, or misalignment.

Quality Assurance (10 Hours)
(Module ID 34407-12) Covers codes governing welding and boilers. Describes weld imperfections and their causes. Identifies and explains different nondestructive and destructive testing methods. Explains how to make visual inspections of fillet welds. Describes welder qualification testing, and stresses the importance of quality workmanship.

Advanced Exchangers (25 Hours)
(Module ID 34411-12) Identifies different types of heat exchangers and their components. Describes methods used to test exchangers, and how to pull exchanger bundles. Explains how to replace a flange and a nozzle on an exchanger.

Advanced Towers (25 Hours)
(Module ID 34412-12) Identifies different types of towers and their components. Explains how to remove and replace different types of packing used in towers. Describes methods used to make field repairs to tower trays. Explains how to remove a tower distributor for maintenance.

Fundamentals of Crew Leadership (20 Hours)
(Module ID 46101-11, Second Edition) Covers basic leadership skills and explains different leadership styles, communication, delegating, and problem solving. Jobsite safety and the crew leader’s role in safety are discussed, as well as project planning, scheduling, and estimating. Includes performance tasks to assist the learning process.
Floor Systems (25 Hours)
Trainee $20
(Module ID 27105-13) Covers framing basics and the procedures for laying out and constructing a wood floor using common lumber, as well as engineered building materials.

Wall Systems (10 Hours)
Trainee $20
(Module ID 27112-13) Describes procedures for laying out and framing walls, including roughing-in door and window openings, constructing corners, partition walls, and bracing walls. Includes the procedure to estimate the materials required to frame walls.

Ceiling Joist and Roof Framing (47.5 Hours)
Trainee $20
(Module ID 27110-13) Introduces types of stairs and common building code requirements related to stairs. Focuses on techniques for measuring and calculating rise, run, and stairwell openings, laying out stringers, and fabricating basic stairways.

Introduction to Building Envelope Systems (12.5 Hours)
Trainee $20
(Module ID 27109-13) Introduces the concept of the building envelope and explains its components. Describes types of windows, skylights, and exterior doors, and provides instructions for installation.

Basic Stair Layout (12.5 Hours)
Trainee $20
(Module ID 27110-13) Introduces types of stairs and common building code requirements related to stairs. Focuses on techniques for measuring and calculating rise, run, and stairwell openings, laying out stringers, and fabricating basic stairways.


 ISBN 978-0-13-340306-0

 ISBN 978-0-13-340465-4


To Order Call: 1-800-922-0579  www.nccer.org/instructors
Reinforcing Concrete (15 Hours)
(Module ID 27304-14) Explains the selection and uses of different types of reinforcing materials. Describes requirements for bending, cutting, splicing, and tying reinforcing steel and the placement of steel in footings and foundations, walls, columns, and beams and girders.

Foundations and Slabs-On-Grade (20 Hours)
(Module ID 27307-14) Covers basic site layout safety, tools, and methods; layout and construction of deep and shallow foundations; types of foundation forms; layout and formation of slabs-on-grade; and forms used for curbing and paving.

Vertical Formwork (22.5 Hours)
(Module ID 27308-14) Covers the applications and construction methods for types of forming and form hardware systems for walls, columns, and stairs, as well as slip and climbing forms. Provides an overview of the assembly, erection, and stripping of gang forms.

Horizontal Formwork (15 Hours)
(Module ID 27309-14) Describes elevated decks and formwork systems and methods used in their construction. Covers joint, pan, beam and slab, flat slab, composite slab, and specialty form systems and provides instructions for the use of flying decks, as well as shaping and reshoring systems.

Handling and Placing Concrete (20 Hours)
(Module ID 27304-14) Covers tools, equipment, and procedures for safely handling, placing, and finishing concrete. Describes joints made in concrete structures and the use of joint sealants.

Tilt-Up Wall Systems (17.5 Hours)
(Module ID 27310-14) Describes how tilt-up concrete construction is used and how tilt-up panels are formed, erected, and braced. Covers the installation of rebar and types of embeddings used to lift and brace the panels. Also covers methods used to create architectural and decorative treatments.

Site Layout One: Differential Leveling (20 Hours)
(Module ID 27401-14) Covers the principles, equipment, and methods used to perform differential leveling. Also covers the layout responsibilities of surveyors, field engineers, and carpenters; interpretation and use of site/plot plan drawings; use of laser instruments; and methods used for on-site communication.

Site Layout Two: Angular and Distance Measurement (37.5 Hours)
(Module ID 27402-14) Covers the principles, equipment, and methods used to perform site layout tasks that require angular and distance measurements. Tasks include laying out building lines and determining elevations by trigonometric leveling. Covers the use of transits, theodolites, electronic distance measurement, and total stations. Reviews trade mathematics needed to perform calculations related to angular measurements.

Advanced Roof Systems (20 Hours)
(Module ID 27403-14) Covers commercial roofing materials and structures and describes the procedures for installing commercial roofing such as lap seam, standing seam, and built-up roofs.

Advanced Wall Systems (25 Hours)
(Module ID 27404-14) Covers installation of a variety of finishing materials, including concrete masonry units and brick. Also covers installation of curtain walls and fire-rated construction.

Advanced Stair Systems (25 Hours)
(Module ID 27405-14) Provides extensive coverage of the materials and techniques used in finishing wooden staircases. Also covers a variety of stair systems used in commercial construction.

Introduction to Construction Equipment (7.5 Hours)
(Module ID 27406-14) Introduces construction equipment, including the aerial lift, skid steer loader, electric power generator, compactor, and forklift. An overview of general safety, operation, and maintenance procedures is provided.

Introduction to Oxyfuel Cutting and Arc Welding (20 Elective Hours)
(Module ID 27407-14) Introduces the equipment, procedures, and safety practices used in cutting steel with oxyfuel equipment, as well as shielded metal arc welding, gas-tungsten arc welding, and gas metal arc welding. Labs include practice in cutting and welding techniques.

Site Preparation (7.5 Hours)
(Module ID 27409-14) Covers the planning process that precedes the start of work on a construction site, including environmental considerations, personnel issues, access roads, traffic control, permits, site safety, utilities, and crane-related concerns.
Carpentry Level 4 (continued)

Fundamentals of Crew Leadership (20 Hours)
(Module 46101-11, Second Edition) Covers basic leadership skills and explains different leadership styles, communication, delegating, and problem solving. Jobsite safety and the crew leader’s role in safety are discussed, as well as project planning, scheduling, and estimating. Includes performance tasks to assist the learning process.

Concrete Finishing

Properties of Concrete (10 Hours)
(Module ID 23103) Introduces the properties of concrete and the components that make up the concrete mixture. Describes chemical and physical properties of cement, aggregate, and admixtures. Explains basic tests used to determine properties such as slump and ultimate strength.

Tools and Equipment (7.5 Hours)
(Module ID 23104) Describes tools and equipment used in the production, placing, and curing of concrete. Explains safe operation and maintenance requirements. Provides opportunities for hand tool operation and demonstration of larger pieces of power equipment.

Preparing for Placement (12.5 Hours)
Trainee ISBN 978-0-13-010258-4
(Module ID 23105) Details the methods and procedures used to prepare for placing concrete. Covers site layout, forms requirements, and subgrade preparation. Describes requirements for joints and reinforcement. Explains how to order concrete from a mixing or batch plant.

Placing Concrete (12.5 Hours)
(Module ID 23106) Presents requirements and methods for properly placing concrete. Includes information on conveying and placing fresh concrete using equipment such as wheelbarrows, pumps, and conveyors. Describes techniques for spreading, consolidating, and striking off concrete.

Finishing, Part One (20 Hours)
(Module ID 23107) Describes basic finishing techniques for slabs and other horizontal structures. Explains the proper use of floats, trowels, edgers, and groovers. Discusses requirements for cutting joints using different types of saws. Provides hands-on practice for finishing concrete slabs.

Curing and Protecting Concrete (5 Hours)
Trainee ISBN 978-0-13-010261-4
(Module ID 23108) Introduces methods and procedures used in curing and protecting concrete. Covers curing commonly performed for both horizontal and vertical placement. Describes techniques for protecting concrete during hot and cold weather.

Introduction to Troubleshooting (5 Hours)
(Module ID 23109) Describes problems of placing, finishing, and curing. Defines symptoms of problems and discusses their causes. Presents ways to reduce or eliminate these problems.

Cabinetmaking

Properties of Concrete, Part Two (5 Hours)
(Module ID 23102) Explains safety requirements for concrete construction and finishing. Provides information on OSHA requirements with regard to hazard communication, fall protection, and use of personal protective equipment. Covers topics such as general work site safety, use of chemicals, and safe use of hand and power tools.

Concrete Finishing

Curing and Protecting Concrete (5 Hours)
Trainee ISBN 978-0-13-010261-4
(Module ID 23108) Introduces methods and procedures used in curing and protecting concrete. Covers curing commonly performed for both horizontal and vertical placement. Describes techniques for protecting concrete during hot and cold weather.

Introduction to Troubleshooting (5 Hours)
(Module ID 23109) Describes problems of placing, finishing, and curing. Defines symptoms of problems and discusses their causes. Presents ways to reduce or eliminate these problems.

From the Ground Up

Curing and Protecting Concrete (5 Hours)
Trainee ISBN 978-0-13-010261-4
(Module ID 23108) Introduces methods and procedures used in curing and protecting concrete. Covers curing commonly performed for both horizontal and vertical placement. Describes techniques for protecting concrete during hot and cold weather.

Introduction to Troubleshooting (5 Hours)
(Module ID 23109) Describes problems of placing, finishing, and curing. Defines symptoms of problems and discusses their causes. Presents ways to reduce or eliminate these problems.

Cabinetmaking

Properties of Concrete, Part Two (5 Hours)
(Module ID 23102) Explains safety requirements for concrete construction and finishing. Provides information on OSHA requirements with regard to hazard communication, fall protection, and use of personal protective equipment. Covers topics such as general work site safety, use of chemicals, and safe use of hand and power tools.
Concrete Finishing Level 2 (continued)

Estimating Concrete Quantities (10 Hours)
(Module ID 23202) Covers the methods and techniques used in estimating materials quantities for concrete construction. Explains the use of plans and drawings as well as math calculations. Gives example calculations for estimating quantities of concrete for curb and gutter, stairs, slab, wall footings, and columns.

Forming (20 Hours)
(Module ID 23203) Describes forming requirements. Includes types of forms, forming materials, use of release agents, form accessories, placement of anchors and embedments, and form removal. Highlights safety requirements with emphasis on redressing precautions and procedures.

Site Concrete (30 Hours)
(Module ID 23204) Includes descriptions and techniques for forming, constructing, and finishing steps and stairs, curbs and gutters, sidewalks and driveways, and low vertical structures.

Architectural Finishes (20 Hours)
(Module ID 23205) Introduces architectural concrete and architectural finishes. Discusses the surface classes of architectural concrete. Includes special surface treatments, special forms, and form liners.

Industrial Floors (22.5 Hours)
(Module ID 23206) Describes the construction and finishing of this special class of concrete work, including special tools and finishing techniques. Explains procedures for preparation, joint layout, placing, finishing, and curing.

Superflat Floors (22.5 Hours)
Trainee $20 ISBN 978-0-13-015053-0
(Module ID 23207) Presents requirements for constructing superflat floors and techniques used to achieve required results. Explains procedures for preparation, placing, finishing, and curing. Discusses techniques for measuring tolerances of slabs and methods for troubleshooting during placement and finishing. Explains repair procedures.

Surface Treatments (12.5 Hours)
(Module ID 23208) Provides an overview of surface treatments applied to concrete structures. Includes the requirements for and application of dry shales, self-leveling topping, epoxies, and shotcrete.

Quality Control (10 Hours)
(Module ID 23209) Introduces the ideas and tasks related to sampling, testing, and inspecting concrete and its component materials. Describes types of specifications, along with the standard procedures for sampling and testing concrete mix. Covers inspection procedures for forms, construction methods, and finishing.

Making Repairs (10 Hours)
(Module ID 23210) Explains the requirements for making repairs to concrete based on specific problems. Explains and demonstrates repair methods. Describes the use of special tools and materials.

Concrete Finishing Level 2 (continued)

Construction Craft Laborer

Basic Communication Skills (7.5 Hours)
(Module ID 00107-15; from Core Curriculum)

Basic Employability Skills (7.5 Hours)
(Module ID 00108-15; from Core Curriculum)

Introduction to Material Handling (5 Hours)
(Module ID 00109-15; from Core Curriculum)

Orientation to the Trade (2.5 Hours)
(Module ID 27101-13; from Carpentry Level One)

Building Materials, Fasteners, and Adhesives (20 Hours)
(Module ID 27102-13; from Carpentry Level One)

Properties of Concrete (10 Hours)
(Module ID 27303-14; from Carpentry Level Three)

Site Layout One: Differential Leveling (20 Hours)
(Module ID 27401-14; from Carpentry Level Four)

Handling and Placing Concrete (20 Hours)
(Module ID 27305-14; from Carpentry Level Three)

Foundations and Slabs-On-Grade (20 Hours)
(Module ID 27307-14; from Carpentry Level Three)

Reinforcing Concrete (15 Hours)
(Module ID 27304-14; from Carpentry Level Three)

Vertical Formwork (22.5 Hours)
(Module ID 27308-14; from Carpentry Level Three)

Horizontal Formwork (15 Hours)
(Module ID 27309-14; from Carpentry Level Three)

Heavy Equipment, Forklift, and Crane Safety (5 Hours)
(Module ID 75123-13; from Field Safety)

Steel Erection (2.5 Hours)
(Module ID 75110-13; from Field Safety)

Electrical Safety (5 Hours)
(Module ID 75121-13; from Field Safety)

Introduction to Construction Equipment (7.5 Hours)
(Module ID 27406-14; from Carpenter Level Four)

Rough Terrain Forklifts (22.5 Hours)
(Module ID 22206-13; from Heavy Equipment Operations Level Two)

Oxyfuel Cutting (17.5 Hours)
(Module ID 29102-15; from Welding Level One)

Elevated Masonry (15 Hours)
(Module ID 28301-14; from Masonry Level Three)

Working from Elevations (5 Hours)
(Module ID 75122-13; from Field Safety)

Your Role in the Green Environment (LEED V4) (15 Hours)
(Module ID 70101-15)
Construction Technology

**MODULES**

**Introduction to Masonry** (12.5 Hours)
(Module ID 28101-13; from Masonry Level One)

**Masonry Units and Installation Techniques** (60 Hours)
(Module ID 28105-13; from Masonry Level One)

**Floor Systems** (27.5 Hours)
(Module ID 27105-13; from Carpentry Level One)

**Ceiling Joist and Roof Framing** (40 Hours)
(Module ID 27112-13; Carpentry Level One)

**Roofing Applications** (25 Hours)
(Module ID 27202-13; from Carpentry Level Two)

**Wall Systems** (20 Hours)
(Module ID 27111-13; Carpenter Level One)

**Exterior Finishing** (35 Hours)
(Module ID 27204-13; from Carpenter Level Two)

**Basic Stair Layout** (12.5 Hours)
(Module ID 27110-13; from Carpenter Level One)

**Electrical Safety** (10 Hours)
(Module ID 26102-14; from Electrical Level One)

**Cabinet Installation** (10 Hours)
(Module ID 27211-13; from Carpenter Level Two)

**Introduction to Construction Equipment**
(7.5 Hours)
(Module ID 27406-14; from Carpenter Level Four)

**Residential Electrical Services** (15 Hours)
(Module ID 26111-14; from Electrical Level One)

**Introduction to HVAC** (7.5 Hours)
(Module ID 03101-13; from HVAC Level One)

**Introduction to Drain, Waste, and Vent (DWV) Systems** (10 Hours)
(Module ID 02111-12; from Plumbing Level One)

**Plastic Pipe and Fittings** (12.5 Hours)
(Module ID 02106-12; from Plumbing Level One)

**Cabinetmaking** (35 Hours)
(Module ID 27501-15)

**Drywall**

**Orientation to the Trade** (5 Hours)
Trainee $20
(Module ID 45101-07) Reviews the history of the trade, shows examples of the work involved, describes the apprentice program, identifies career opportunities for construction workers, and lists the responsibilities and characteristics a worker should possess.

**Construction Materials and Methods** (12 Hours)
Trainee $20
(Module ID 45102-07) Provides an overview of the materials and techniques used in building and finishing residential and commercial buildings, including wood- and steel-framed structures, masonry construction, and concrete-formed structures.

**Thermal and Moisture Protection** (7.5 Hours)
Trainee $20
(Module ID 45103-07) Covers the selection and installation of insulating materials in walls, floors, and attics. Also covers the uses and installation practices for vapor barriers and waterproofing materials.

**Drywall Installation** (25 Hours)
Trainee $20
(Module ID 45104-07) Discusses types of gypsum drywall, their uses, and the fastening devices and methods used to install them. Describes installing drywall on walls and ceilings using nails, drywall screws, and adhesives. Also covers fire- and sound-rated walls.

**Drywall Finishing** (25 Hours)
Trainee $20
ISBN 978-0-13-604848-0
(Module ID 45105-07) Covers the materials, tools, and methods used to finish and patch gypsum drywall, including automatic and manual taping tools.

**Commercial Drawings** (25 Hours)
Trainee $20
(Module ID 45201-09) Focuses on techniques for reading and using architectural and structural drawings and specifications.
Steel Framing (50 Hours)
Trainee $20
(Module ID 45202-09) Describes the types and grades of steel framing and provides instructions for selecting and installing steel framing for interior walls, exterior non-bearing walls, and partitions. Also covers engineered framing systems.

Acoustical Ceilings (20 Hours)
Trainee $20
(Module ID 45203-09) Describes the materials, layout, and installation procedures for suspended ceilings used in commercial construction. Also covers ceiling tiles, drywall suspension systems, and panel-type ceilings.

Electrical

Introduction to Electrical Circuits (7.5 Hours)
Trainee $20
(Module ID 26103-17) Introduces electrical concepts used in Ohm’s law applied to DC series circuits. Covers atomic theory, electro motive force, resistance, and electric power equations.

Electrical Theory (7.5 Hours)
Trainee $20
(Module ID 26107-17) Introduces conduit bending and installation. Covers the techniques for using hand-operated and step conduit benders, as well as cutting, reaming, and threading conduit.

Device Boxes (10 Hours)
Trainee $20
(Module ID 26104-17) Covers the electrical devices and NEC® fill and pull requirements for device, pull, and junction boxes under 100 cubic inches.

Hand Bending (10 Hours)
Trainee $20
(Module ID 26105-17) Introduces conduit bending and installation. Covers the techniques for using hand-operated and step conduit benders, as well as cutting, reaming, and threading conduit.

Raceways and Fittings (20 Hours)
Trainee $20
(Module ID 26108-17) Provides an overview of the electrical trade and discusses the career paths available to electricians.

Electrical Safety (10 Hours)
Trainee $20
(Module ID 26109-17) Focuses on the types and applications of conductors and covers proper wiring techniques. Stresses the applicable NEC® requirements.

Conductors and Cables (10 Hours)
Trainee $20
(Module ID 26106-17) Covers electrical devices and NEC® fill and pull requirements for device, pull, and junction boxes under 100 cubic inches.

Residential Electrical Services (15 Hours)
Trainee $20
(Module ID 26101-17) Provides an overview of the electrical trade and discusses the career paths available to electricians.

Specialty Finishes (15 Hours)
Trainee $20
(Module ID 45206-09) Covers the composition and use of specialty interior finishing products, such as vinyl- and fabric-covered panels, wood wall and ceiling panels, and glass fiber-reinforced gypsum (GFRG) panels.

Acoustical Ceilings (20 Hours)
Trainee $20
(Module ID 45203-09) Describes the materials, layout, and installation procedures for suspended ceilings used in commercial construction. Also covers ceiling tiles, drywall suspension systems, and panel-type ceilings.

Electrical

Introduction to Electrical Circuits (7.5 Hours)
Trainee $20
(Module ID 26103-17) Introduces electrical concepts used in Ohm’s law applied to DC series circuits. Covers atomic theory, electromotive force, resistance, and electric power equations.

Electrical Theory (7.5 Hours)
Trainee $20
(Module ID 26104-17) Introduces the layout and the types of information found within the code book. Allows trainees to practice finding information using an easy-to-follow procedure.

Device Boxes (10 Hours)
Trainee $20
(Module ID 26105-17) Introduces conduit bending and installation. Covers the techniques for using hand-operated and step conduit benders, as well as cutting, reaming, and threading conduit.

Raceways and Fittings (20 Hours)
Trainee $20
(Module ID 26108-17) Provides an overview of the electrical trade and discusses the career paths available to electricians.

Electrical Safety (10 Hours)
Trainee $20
(Module ID 26109-17) Focuses on the types and applications of conductors and covers proper wiring techniques. Stresses the applicable NEC® requirements.

Conductors and Cables (10 Hours)
Trainee $20
(Module ID 26106-17) Covers electrical devices and NEC® fill and pull requirements for device, pull, and junction boxes under 100 cubic inches.

Residential Electrical Services (15 Hours)
Trainee $20
(Module ID 26101-17) Provides an overview of the electrical trade and discusses the career paths available to electricians.

Specialty Finishes (15 Hours)
Trainee $20
(Module ID 45206-09) Covers the composition and use of specialty interior finishing products, such as vinyl- and fabric-covered panels, wood wall and ceiling panels, and glass fiber-reinforced gypsum (GFRG) panels.

Acoustical Ceilings (20 Hours)
Trainee $20
(Module ID 45203-09) Describes the materials, layout, and installation procedures for suspended ceilings used in commercial construction. Also covers ceiling tiles, drywall suspension systems, and panel-type ceilings.
MODULES
All of the modules below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

Alternating Current (17.5 Hours)
Trainee $20
ISBN 978-0-13-478337-6 (Module ID 26201-17) Describes forces that are characteristic of alternating-current systems and the application of Ohm’s law to AC circuits.

Motors: Theory and Application (20 Hours)
Trainee $20

Electric Lighting (15 Hours)
Trainee $20

Conduit Bending (15 Hours)
Trainee $20

Pull and Junction Boxes (12.5 Hours)
Trainee $20

Conductor Installations (10 Hours)
Trainee $20
ISBN 978-0-13-480499-6 (Module ID 26206-17) Covers the transportation, storage, and setup of cable reels; methods of rigging; and procedures for complete cable pulls in raceways and cable trays.

Cable Tray (7.5 Hours)
Trainee $20
ISBN 978-0-13-480502-3 (Module ID 26207-17) Focuses on NEC® installation requirements for cable tray, including cable installations.

Conductor Terminations and Splices (7.5 Hours)
Trainee $20

Grounding and Bonding (15 Hours)
Trainee $20

Circuit Breakers and Fuses (12.5 Hours)
Trainee $20
ISBN 978-0-13-480509-2 (Module ID 26210-17) Describes fuses and circuit breakers along with their practical applications. Also covers sizing.

Control Systems and Fundamental Concepts (12.5 Hours)
Trainee $20
ISBN 978-0-13-480511-5 (Module ID 26211-17) Gives basic descriptions of various types of contactors and relays along with their practical applications.

Electrical Level 2 (continued)

L3 ELECTRICAL

Curriculum Notes
- 155 Hours
- Downloadable instructor resources that include module tests, PowerPoint®es, and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK ISBN
Trainee Guide: $97 978-0-13-473822-9
NCCERconnect Access Card: $97 978-0-13-481266-3

MODULES
All of the modules below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

Load Calculations — Branch and Feeder Circuits (17.5 Hours)
Trainee $20

Conductor Selection and Calculations (15 Hours)
Trainee $20
ISBN 978-0-13-480514-6 (Module ID 26302-17) Covers the factors involved in conductor selection, including insulation types, current-carrying capacity, temperature ratings, and voltage drop.

Practical Applications of Lighting (12.5 Hours)
Trainee $20
ISBN 978-0-13-480515-3 (Module ID 26303-17) Describes specific types of incandescent, fluorescent, and HID lamps, as well as ballasts. Also covers troubleshooting and various types of lighting controls.

Hazardous Locations (15 Hours)
Trainee $20

Overcurrent Protection (25 Hours)
Trainee $20

Distribution Equipment (12.5 Hours)
Trainee $20

Transformer (12.5 Hours)
Trainee $20

Commercial Electrical Services (10 Hours)
Trainee $20
ISBN 978-0-13-480530-6 (Module ID 26308-17) Covers the components, installation considerations, and NEC® requirements for commercial services.

Motor Calculations (12.5 Hours)
Trainee $20

Voice, Data, and Video (10 Hours)
Trainee $20
ISBN 978-0-13-480533-7 (Module ID 26310-17) Covers installation, termination, and testing of voice, data, and video cabling systems.

Motor Controls (12.5 Hours)
Trainee $20

L4 ELECTRICAL

Curriculum Notes
- 182.5 Hours
- Downloadable instructor resources that include module tests, PowerPoint®es, and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK ISBN
Trainee Guide: $97 978-0-13-473822-9
NCCERconnect Access Card: $97 978-0-13-481266-7

MODULES
All of the modules below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

Load Calculations — Feeders and Services (20 Hours)
Trainee $20
ISBN 978-0-13-480538-2 (Module ID 26401-17) Topics include basic calculation procedures for commercial and residential applications.

Health Care Facilities (10 Hours)
Trainee $20

Standby and Emergency Systems (10 Hours)
Trainee $20
ISBN 978-0-13-480543-6 (Module ID 26403-17) Explains the NEC® requirements for electric generators and storage batteries.

Basic Electronic Theory (10 Hours)
Trainee $20
ISBN 978-0-13-480546-7 (Module ID 26404-17) Explains the function and operation of basic electronic devices, including semiconductors, diodes, rectifiers, and transistors.

Fire Alarm Systems (15 Hours)
Trainee $20
Specialty Transformers (10 Hours)
Trainee $20
(Module ID 26406-17) Covers various types of transformers and their applications. Also provides information on selecting, sizing, and installing these devices.

Advanced Controls (20 Hours)
Trainee $20
(Module ID 26407-17) Discusses applications and operating principles of solid-state controls, reduced-voltage starters, and adjustable frequency drives. Also covers basic troubleshooting procedures.

HVAC Controls (15 Hours)
Trainee $20
(Module ID 26408-17) Provides a basic overview of HVAC systems and their controls. Also covers electrical troubleshooting and NEC® requirements.

Heat Tracing and Freeze Protection (10 Hours)
Trainee $20
(Module ID 26409-17) Covers heat tracing systems along with their applications and installation requirements.

Motor Operation and Maintenance (10 Hours)
Trainee $20
(Module ID 26410-17) Covers motor cleaning, testing, and troubleshooting procedures. Also covers basic troubleshooting procedures.

Medium-Voltage Terminations/Splices (10 Hours)
Trainee $20
(Module ID 26411-17) Offers an overview of the NEC® and cable manufacturers’ requirements for medium-voltage terminations and splices.

Special Locations (20 Hours)
Trainee $20
(Module ID 26412-17) Describes NEC® requirements for selecting and installing equipment, enclosures, and devices in special locations including places of assembly, theaters, carnivals, agricultural buildings, marinas, temporary installations, wired partitions, and swimming pools.

Fundamentals of Crew Leadership (22.5 Hours)
Trainee $20
(Module ID 46101-17, Third Edition) Covers basic leadership principles of solid-state controls, reduced-voltage starters, and adjustable frequency drives. Also covers basic troubleshooting procedures. Also describes how to plan and conduct work around them. Includes examples of how to complete an energized electrical work permit, and how to select the specialized personal protective equipment required for electrical work.

Managing Electrical Hazards

Electronic Systems Technician

Wood and Masonry Construction Methods

Concrete and Steel Construction Methods

Electrical Level 4 (continued)
Pathways and Spaces (12.5 Hours)
Trainee $20
(Module ID 33104-10) Introduces conduits and wireways used in low-voltage applications, along with their supporting hardware and fittings. Covers telecommunications cable pathways from the source to the destination, including maintenance holes, ducts, equipment rooms, and telecommunications closets.

Craft-Related Mathematics (12.5 Hours)
Trainee $20
(Module ID 33105-10) Expands on the Core Curriculum module Introduction to Construction Math with an emphasis on the metric system, including how to convert between English and metric units. Also covers the use of scientific notation, powers and roots, and the basic concepts of algebra, geometry, and right-angle trigonometry.

Introduction to Construction Math
Trainee $20
(Module ID 33106-10) Introduces conduit bending and installation. Covers techniques for using hand-operated conduit benders, as well as cutting, reaming, and threading conduit.

Introduction to the National Electrical Code® (7.5 Hours)
Trainee $20
(Module ID 33107-10) Provides a road map for using the NEC® by introducing the layout and the types of information found within the code book. Allows trainees to practice finding information using an easy-to-follow procedure.

Low-Voltage Cabling (20 Hours)
Trainee $20
(Module ID 33108-10) Covers the makeup, identification, and applications of conductors and cables used in telecommunications and security systems. Describes the tools, materials, and procedures for pulling cables through conduit and raceways.

DC Circuits (15 Hours)
Trainee $20
(Module ID 33201-10) Introduces electrical concepts used in Ohm’s law as applied to DC series circuits. Describes atomic theory, electromagnetic force, resistance, and electrical power equations. Introduces series, parallel, and series-parallel DC circuits. Covers Kirchhoff’s voltage and current laws and circuit analysis.

AC Circuits (20 Hours)
Trainee $20
(Module ID 33202-10) Introduces AC theory, circuits, and components, including inductors, capacitors, and transformers. Covers the calculation of reactivity and impedance in RL, RC, LC, and RLC circuits using math and vector analysis.

Switching Devices and Timers (15 Hours)
Trainee $20
(Module ID 33203-10) Presents the principles of operation and describes the different types and configurations of switches, relays, timers, and photoelectric devices. Covers guidelines for the selection of appropriate devices using specification sheets.

Semiconductors and Integrated Circuits (10 Hours)
Trainee $20
(Module ID 33204-10) Introduces the principles of electronics and semiconductor theory, components, and applications.

Test Equipment (10 Hours)
Trainee $20
(Module ID 33205-10) Covers the selection, inspection, use, and maintenance of basic test equipment used in low-voltage work. Also covers specialized test equipment such as signal generators, wattmeters, cable testers, and RF analyzers.

Introduction to Electrical Drawings (10 Hours)
Trainee $20
(Module ID 33206-10) Describes electrical prints, drawings, and symbols and the types of information that can be found on schematics, one-line drawings, and wiring diagrams.

Introduction to Codes and Standards (10 Hours)
Trainee $20
(Module ID 33207-10) Describes the scope and content of the major codes and standards that apply to telecommunications, life safety, security, and other low-voltage systems. Emphasizes an familiarization with and use of the NEC®.

Cable Selection (10 Hours)
Trainee $20
(Module ID 33208-10) Provides an overview of the types of cable used for low-voltage installations. Also covers the methods used to select the proper size and type of cable for a typical installation.

Wire and Cable Terminations (25 Hours)
Trainee $20
(Module ID 33209-10) Provides information and instructions for selecting, installing, and testing connectors and other terminating devices on cables used in low-voltage work, including telecommunications, video and audio, and fiber optics.

Power Quality and Grounding (20 Hours)
Trainee $20
(Module ID 33210-10) Covers grounding and bonding of electrical systems. Discusses NEC® regulations pertaining to grounding and bonding. Covers equipment and devices used for grounding and bonding, including their methods of installation. Explains power quality, along with the causes and effects of poor power quality.

MODULES
All of the modules below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

Buses and Networks (25 Hours)
Trainee $20
(Module ID 33301-11) Details procedures for connecting computers and components, including network connections. Provides information on connecting controls and equipment in a control system, and explains how data is transferred between the nodes in a network.

Fiber Optics (25 Hours)
Trainee $20
(Module ID 33302-11) Introduces the types of equipment and methods used in fiber-optic cable installation.

Wireless Communication (10 Hours)
Trainee $20
(Module ID 33303-11) Introduces operating principles and equipment used in radio frequency (RF) and infrared (IR) wireless communication systems. Covers RF communication systems, IR-controlled systems, power line carrier (PLC) systems, RF and IR wireless computer networks, and satellite communication systems. Discusses the equipment used for testing and troubleshooting wireless communication systems.

Site Survey, Project Planning, and Documentation (15 Hours)
Trainee $20
(Module ID 33304-11) Explains planning a job from start to finish, including how to perform site surveys for new and retrofit construction projects. Covers drawings, specifications, and other documents commonly used.
Electronic Systems Technician Level 3 (continued)

**Fundamentals of Crew Leadership (20 Hours)**
Trainee
(Module ID 46101-11, Second Edition) Covers basic leadership skills and explains different leadership styles, communication, delegating, and problem solving. Jobsite safety and the crew leader’s role in safety are discussed, as well as project planning, scheduling, and estimating. Includes performance tasks to assist the learning process.

**Rack Assembly (17.5 Hours)**
Trainee S20
(Module ID 33305-11) Describes rack systems and best practices for assembling electronic system enclosures, including power sequencing, grounding, weight distribution, and heat dissipation. Explains electrical power distribution and load calculations for equipment housed within racks.

**System Commissioning and User Training (20 Hours)**
Trainee S20
(Module ID 33306-11) Covers the final testing and closeout procedures and how to build these activities into projects. Describes customer satisfaction levels and expectations and how to meet them during the cut-over phase of any project. Focuses on industry best practices and user-required training.

**Maintenance and Repair (20 Hours)**
Trainee S20
(Module ID 33307-11) Introduces tasks involved in the maintenance and repair of low-voltage systems and equipment. Presents a systematic approach to system and component-level troubleshooting and methods of identifying common types of repairs.

**Curriculum Notes**
- 325 Total Hours (175 Audio, Video & Data Training Path and 175 Life Safety & Security Training Path)
- Revised: 2012, Third Edition
- Downloadable instructor resources that include module tests, PowerPoint® and performance profile sheets are available at www.nccer.org/irc.
- Modules 33401-12, 33402-12, 33403-12, and 33404-12 carry SBCA’s endorsement of training in support of its Satellite Fundamentals, Home Theater Fundamentals, and MDU/SMATV certifications.
- Module 33408-12 supports skills and knowledge statements as the basis for NICET Fire Alarm Installer Certification Tests.

**PAPERBACK**
Trainee Guide: $97
NCCERconnect Access Card: $97
978-0-13-443625-8
NCCERconnect +
Trainee Guide: $122
978-0-13-453975-1

**MODULES**
All of the modules below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

**Audio Systems (30 Hours)**
Trainee S20
(Module ID 33401-12) Introduces and explains audio system components, including input sources, amplifiers, signal processing equipment, and output equipment. Describes power requirements, cabling options, system configuration, and basic design considerations. Reviews common test equipment used for installation and troubleshooting.

**Video Systems (40 Hours)**
Trainee S20
(Module ID 33402-12) Describes types of equipment used in various video systems and equipment, including both analog and digital video, video signaling, display devices, HDTV, 3-D video, and video processing and distribution.

**Broadband Systems (40 Hours)**
Trainee S20
(Module ID 33403-12) Describes the major elements of head-end design for specialized television systems, including CATV, SMATV, and MATV systems. Explains the function and operation of receivers, modulators, amplification, and distribution devices. Discusses proper signal levels, cable attenuation, insertion loss, and acceptable carrier-to-noise levels. Covers common test equipment and troubleshooting procedures.

**Media Management Systems (20 Hours)**
Trainee S20
(Module ID 33404-12) Explains the basic principles behind shared media resources and their access via a computer network or hardwired application. Describes media types for both analog and digital platforms. Explores cabling options including fiber-optic interfaces.

**Telecommunications Systems (20 Hours)**
Trainee S20
(Module ID 33405-12) Describes the history and current use of basic subscriber systems. Also covers PBX systems used in business applications and Central Office services used to interface to the public switched telephone network (PSTN).

**Intrusion Detection Systems (30 Hours)**
Trainee S20
(Module ID 33407-12) Describes devices such as sensors, notification, control panels, and programming used in intrusion detection security systems. Covers system design and installation guidelines, wiring, testing, and troubleshooting. Emphasizes codes and standards.

**Fire Alarm Systems (40 Hours)**
Trainee S20
ISBN 978-0-13-292263-0
(Module ID 33408-12) Covers the basics of fire alarm systems, including devices, circuits, system design and installation guidelines, power requirements, control panel programming, testing, and troubleshooting. Explores integration of fire alarms with other systems. Examines both residential and commercial fire alarm applications, emphasizing NEC® requirements.

**Overview of Nurse Call and Signaling Systems (15 Hours)**
Trainee S20
(Module ID 33409-12) Presents an overview of nurse call and signaling systems as found in hospitals and other health-care facilities. Covers basic emergency call and duress system requirements based on facility type. Identifies installation requirements based on UL and other building code specifications.

**CCTV Systems (30 Hours)**
Trainee S20
(Module ID 33410-12) Describes the installation and configuration of closed circuit TV systems for small, medium, and large facilities. Explains various equipment, including cameras, lenses, remote-positioning, video recording, and transmission. Covers the roles of the internet and digital technologies. Introduces test and troubleshooting equipment.

**Access Control Systems (35 Hours)**
Trainee S20
(Module ID 33411-12) Introduces access control systems, including applications, door locking systems, readers, biometrics, and controllers. Emphasizes installation practices as well as building and electrical codes.
Introduction to Earthmoving (12.5 Hours)
(Module ID 22201-12) Provides an introduction to the process of planning and executing earthmoving activities on various types of construction projects. The use of heavy equipment such as bulldozers, scrapers, excavators, and loaders is explained.

Grades (15 Hours)
(Module ID 22106-12) Introduces the concept of preparing graded surfaces using heavy equipment. Covers identification of construction stakes and interpretation of marks on each type of stake. Describes the process for grading slopes.

Site Work (20 Hours)  ISBN 978-0-13-340326-8
Trainee $20  (Module ID 22210-13) Expands on information covered in Level 1 in relation to setting and interpreting grade stakes. Also provides information and instructions on controlling surface water and ground water on a job site, as well as the layout of foundations and laying of pipe.

Trainee $20  (Module ID 22308-13) Describes soil classification systems and explains how shrink and swell factors affect equipment selection. Discusses how soil conditions affect equipment performance and explains techniques for working with various types of soils.

Skid Steers (22.5 Hours)  ISBN 978-0-13-340327-5
Trainee $20  (Module ID 22212-13) Describes the many uses of skid steers and the attachments available for these machines. Covers safety practices, as well as inspection, startup, shutdown, and operation of skid steers.

Loaders (17.5 Hours)  ISBN 978-0-13-340321-3
Trainee $20  (Module ID 22205-13) Covers the uses of wheel and track loaders, as well as operator maintenance, loader safety, and operating procedures. Includes procedures for using loaders in excavation, grading, and demolition work.

Scrapers (17.5 Hours)  ISBN 978-0-13-340320-6
Trainee $20  (Module ID 22204-13) Describes the types of scrapers used in site preparation, as well as the safe practices associated with the operation of scrapers. Covers operator inspection and maintenance requirements, along with startup, shutdown, and operating techniques.

To Order Call: 1-800-922-0579  Stay Connected:  www.nccer.org/instructors
Heavy Equipment Operations Level 3

Compack Equipment (25 Hours)
Trainee $20
(Module ID 22203-14) Provides training on common types of compaction equipment; the primary instruments, controls, and attachments of a roller; safety guidelines associated with compaction equipment; and prestart inspections, preventive maintenance, and proper operating procedures. Presents factors involved in work activities associated with a roller.

Backhoes (30 Hours)
Trainee $20
(Module ID 22303-14) Identifies and describes the common uses, types, components, instruments, controls, and attachments of backhoes. Presents safety guidelines, prestart inspection procedures, and preventive maintenance requirements. Describes basic startup and operation, and covers common work activities associated with backhoes.

Off-Road Dump Trucks (30 Hours)
Trainee $20
(Module ID 22310-14) Identifies and describes the common types, uses, and components of off-road dump trucks. Presents safety guidelines, prestart inspection procedures, and preventive maintenance requirements. Covers basic startup, driving maneuvers, loading, and dumping procedures for off-road dump trucks.

Dozers (30 Hours)
Trainee $20
ISBN 978-0-13-382759-0
(Module ID 22302-14) Identifies and describes the common uses, types, and components of dozers. Presents safety guidelines, prestart inspection procedures, and preventive maintenance requirements. Describes basic startup and operation, and covers common work activities associated with dozers.

Excavators (40 Hours)
Trainee $20
(Module ID 22305-14) Identifies and describes the common uses and types of motor graders. Presents safety guidelines, prestart inspection procedures, and preventive maintenance requirements. Describes basic startup and operation, and covers common work activities associated with excavators.

Rough Terrain Mobile Crane Operations, Level Three
Trainee $20
(Module ID 22306-14) Identification and describes the common uses, types, and components of rough terrain mobile cranes. Presents safety guidelines, prestart inspection procedures, and preventive maintenance requirements. Describes basic startup and operation, and covers common work activities associated with rough terrain mobile cranes.

Crane Safety and Emergency Procedures
Trainee $20
(Module ID 22307-14) Identifies and describes the common uses, types, and components of cranes. Presents safety guidelines, prestart inspection procedures, and preventive maintenance requirements. Describes basic startup and operation, and covers common work activities associated with cranes.

Motor Graders (40 Hours)
Trainee $20
(Module ID 22308-14) Identifies and describes the common uses, types, and components of motor graders. Presents safety guidelines, prestart inspection procedures, and preventive maintenance requirements. Describes basic startup and operation, and covers common work activities associated with motor graders.

Crawler Dozers (40 Hours)
Trainee $20
ISBN 978-0-13-377966-0
(Module ID 22309-14) Identifies and describes the common uses, types, and components of crawler dozers. Presents safety guidelines, prestart inspection procedures, and preventive maintenance requirements. Describes basic startup and operation, and covers common work activities associated with crawler dozers.

Soils (30 Hours)
Trainee $20
(Module ID 22311-14) Identifies and describes the common uses, types, and components of soils. Presents safety guidelines, prestart inspection procedures, and preventive maintenance requirements. Describes basic startup and operation, and covers common work activities associated with soils.

Mobile Crane Operations, Level Three
Trainee $20
(Module ID 22312-14) Identifies and describes the common uses, types, and components of mobile cranes. Presents safety guidelines, prestart inspection procedures, and preventive maintenance requirements. Describes basic startup and operation, and covers common work activities associated with mobile cranes.

Mobile Crane Safe Lifting Procedures
Trainee $20
(Module ID 22313-14) Identifies and describes the common uses, types, and components of mobile cranes. Presents safety guidelines, prestart inspection procedures, and preventive maintenance requirements. Describes basic startup and operation, and covers common work activities associated with mobile cranes.

Crane Operation and Maintenance
Trainee $20
(Module ID 22314-14) Identifies and describes the common uses, types, and components of cranes. Presents safety guidelines, prestart inspection procedures, and preventive maintenance requirements. Describes basic startup and operation, and covers common work activities associated with cranes.

Crane Rigging and Signal Person Procedures
Trainee $20
ISBN 978-0-13-377971-4
(Module ID 22315-14) Identifies and describes the common uses, types, and components of cranes. Presents safety guidelines, prestart inspection procedures, and preventive maintenance requirements. Describes basic startup and operation, and covers common work activities associated with cranes.

Plant Operations (7.5 Hours)
Trainee $20
(Module ID 36017-14) Identifies and describes the common uses, types, and components of plant operations. Presents safety guidelines, prestart inspection procedures, and preventive maintenance requirements. Describes basic startup and operation, and covers common work activities associated with plant operations.

Crane Communications (10 Hours)
Trainee $20
(Module ID 53101-18; from Signal Person)
Heavy Highway Construction Level 2 (continued)

Paving (12.5 Hours)
Trainee $20
(Module ID 36108-17) Describes paving operations, paving equipment, recycling processes, and quality control requirements for both concrete and hot-mix asphalt paving.

Horizontal Formwork (15 Hours)
(Module ID 27309-14; from Carpentry Level Three)
Trainee $20

Vertical Formwork (22.5 Hours)
(Module ID 27308-14; from Carpentry Level Three)
Trainee $20

Reinforcing Concrete (15 Hours)
(Module ID 36117-12) Introduces the trainees to the safety concerns associated with concrete, as well as concrete testing, concrete admixtures, and the proper procedure for placing concrete.

Trade Drawings One (12.5 Hours)
(Module ID 30108-11; from Ironworking Level One)
Trainee $20
ISBN 978-0-13-215103-0

Structural Ironworking One (7.5 Hours)
(Module ID 30109-11; from Ironworking Level One)
Trainee $20

Bridge Construction (20 Hours)
Trainee $20
(Module ID 36201-17) Describes the common types of bridges, along with the components that make up the substructure and superstructure of a bridge. The module also discusses the types of materials used in bridge construction, presents basic surveying equipment and practices, and explains how to interpret bridge drawings.

Bridge Foundations (10 Hours)
Trainee $20
(Module ID 36202-17) Describes the types of footings used to support bridges, as well as various types of piles and pile-driving methods. Safety practices associated with pile driving on land and in marine environments are also covered, along with environmental protection issues.

Bridge Formwork (22.5 Hours)
Trainee $20
(Module ID 36203-17) Describes the forms used to fabricate concrete walls, columns, footings, pile caps, and other bridge structures. This module covers site-built and manufactured forming systems and includes instructions for cleaning and storing forms.

Hydroblasting

20 Hours
Revised: 2012, Second Edition
Module ID 43101-12

Training Guide: $28

- Downloadable instructor resources that include module tests, PowerPoints® and performance profile sheets are available at www.nccer.org/irc.
- Includes the newest waterjet safety technologies, methods, and equipment. Also provides expanded information on shrouds, shielding, checking, and grounding.

HVAC

Introduction to HVAC (7.5 Hours)
Trainee $20
(Module ID 03101) Covers the basic principles of heating, ventilating, and air conditioning, career opportunities in HVAC, and how apprenticeship programs are constructed. Basic safety principles, as well as trade licensure and EPA guidelines, are also introduced.

Trade Mathematics (10 Hours)
Trainee $20
(Module ID 03102) Explains how to solve HVAC/R trade-related problems involving the measurement of lines, area, volume, weights, angles, pressure, vacuum, and temperature. Also includes a review of scientific notation, powers, roots, and basic algebra and geometry.

Basic Electricity (12.5 Hours)
Trainee $20
(Module ID 03106) Introduces the concept of power generation and distribution, common electrical components, AC and DC circuits, and electrical safety as it relates to the HVAC field. Introduces reading and interpreting wiring diagrams.

Introduction to Heating (15 Hours)
Trainee $20
(Module ID 03108) Covers the fundamentals of heating systems and the combustion process. Provides the different types and designs of gas furnaces and their components, as well as basic procedures for their installation and service.

Introduction to Cooling (30 Hours)
Trainee $20
(Module ID 03107) Explains the fundamental operating concepts of the refrigeration cycle and identifies both primary and secondary components found in typical HVAC/R systems. Also introduces common refrigerants. Describes the principles of heat transfer and the essential pressure-temperature relationships of refrigerants. Introduces basic control concepts for simple systems.

Introduction to Air Distribution Systems (15 Hours)
Trainee $20
(Module ID 03109) Describes the factors related to air movement and its measurement in common air distribution systems. Presents the required mechanical equipment and materials used to create air distribution systems. Introduces basic system design principles for both hot and cold climates.

To Order Call: 1-800-922-0579
Stay Connected: www.nccer.org/instructors

Stay Connected:
To Order Call: 1-800-922-0579
www.nccer.org/instructors
Trainee $20

Refrigerants and Oils systems. Includes installation, service, and repair procedures. (Module ID 03302)

Explains operating principles of electrical safety.

three-phase power distribution, capacitors, the theory and (Module ID 03206)

Covers transformers, single-phase and AC Guide. The following ISBN and pricing information is for ordering individual modules only.


NCCERconnect Access Card: $97

Trainee Guide: $97

NCCERconnect +

Trainee Guide: $122

LEVEL 2

Curriculum Notes

• 175 Hours
• Updated in 2018.
• NATE-Recognized Training Provider
• Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK
ISBN
Trainee Guide: $97 978-0-13-518510-0
NCCERconnect Access Card: $97 978-0-13-518722-7
NCCERconnect +

MODULES

All of the modules listed below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

Fasteners, Hardware, and Wiring Terminations (10 Hours)
Trainee $20 ISBN 978-0-13-546190-7 (Module ID 03313) Covers a variety of fasteners, hardware, and wiring terminations used in HVAC systems including the installation of these components.

Control Circuit and Motor Troubleshooting (30 Hours)
Trainee $20 ISBN 978-0-13-546189-1 (Module ID 03314) Provides information and skills to troubleshoot control circuits and electric motors found in heating and cooling equipment.

Troubleshooting Cooling (20 Hours)

Troubleshooting Heat Pumps (12.5 Hours)
Trainee $20 ISBN 978-0-13-546186-0 (Module ID 03311) Provides a thorough review of the heat pump operating cycle, and presents troubleshooting procedures for components.

Troubleshooting Gas Heating (15 Hours)

Troubleshooting Oil Heating (15 Hours)
Trainee $20 ISBN 978-0-13-546199-0 (Module ID 03310) Describes the construction and operation of oil-fired heating systems and their components. Includes servicing and testing of oil furnaces and procedures for isolating and correcting oil furnace malfunctions.

Troubleshooting Accessories (7.5 Hours)
Trainee $20 ISBN 978-0-13-546182-2 (Module ID 03312) Delivers information and skills needed to troubleshoot various air treatment accessories used with heating and cooling equipment.

Basic Copper and Plastic Piping Practices (10 Hours)
Trainee $20 ISBN 978-0-13-545832-7 (Module ID 03103) Explains how to identify types of copper tubing and fittings used in the HVAC/R industry and how they are mechanically joined. Also presents the identification and application of various types of plastic piping, along with their common assembly and installation practices.

Soldering and Brazing (10 Hours)
Trainee $20 ISBN 978-0-13-545829-7 (Module ID 03104) Introduces the equipment, techniques, and materials used to safely join copper tubing through both soldering and brazing. Covers the required personal protective equipment, preparation, and work processes in detail. Also provides the procedures for brazing copper to dissimilar materials.

Basic Carbon Steel Piping Practices (10 Hours)
Trainee $20 ISBN 978-0-13-545828-0 (Module ID 03105) Explains how to identify various carbon steel piping materials and fittings. Covers the joining and installation of threaded and grooved carbon steel piping systems, including detailed descriptions of threading and grooving techniques.

L2 HVAC

Leak Detection, Evacuation, Recovery, and Charging (30 Hours)

Metering Devices (12.5 Hours)
Trainee $20 ISBN 978-0-13-546039-9 (Module ID 03303) Covers the operating principles, applications, installation, and adjustment of fixed and adjustable expansion devices used in air conditioning equipment.

Heat Pumps (20 Hours)
Trainee $20 ISBN 978-0-13-546026-9 (Module ID 03211) Covers the principles of reverse cycle heating. Describes the operation of heat pumps and explains how to analyze heat pump control circuits. Includes heat pump installation and service procedures.

Basic Maintenance (20 Hours)
Trainee $20 ISBN 978-0-13-546054-2 (Module ID 03215) Covers information related to maintenance-oriented materials, as well as guidelines for the inspection and periodic maintenance of various systems and accessories. Also covers the application of gaskets and seals, as well as the adjustment of different types of belt drives. Includes information on inspection and maintenance requirements for selected equipment.

Chimneys, Vents, and Flues (5 Hours)

Sheet Metal Duct Systems (10 Hours)

Fiberglass and Flexible Duct Systems (7.5 Hours)

Commercial Airside Systems (12.5 Hours)
Trainee $20 ISBN 978-0-13-546046-7 (Module ID 03201) Describes the systems, equipment, and operating sequences commercial airside system configurations such as constant volume single-zone and multi-zone, VVT, VAV, and dual-duct VAV.

Air Quality Equipment (5 Hours)
Trainee $20 ISBN 978-0-13-546030-6 (Module ID 03204) Covers principles, processes, and devices used to control humidity and air cleanliness, as well as devices used to conserve energy in HVAC systems.

Introduction to Hydronic Systems (15 Hours)

L3 HVAC

Curriculum Notes

• 167.5 Hours
• Updated in 2018.
• NATE-Recognized Training Provider
• Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

To Order Call: 1-800-922-0579 www.nccer.org/instructors
Zoning, Ductless, and Variable Refrigerant Flow Systems (15 Hours)
Trainee $20
(Module ID 03315) Introduces the information and skills needed to troubleshoot and repair zoned, ductless, and variable refrigerant flow systems.

Commercial Hydronic Systems (12.5 Hours)
Trainee $20
(Module ID 03305) Reviews basic properties of water and describes how water pressure is related to the movement of water through piping systems. Describes various types and components of commercial hot-water heating and chilled-water cooling systems, and examines how those systems function.

Steam Systems (10 Hours)
Trainee $20
(Module ID 03306) Focuses on the use of steam for storing and moving energy in HVAC systems. Reviews the fundamentals of water that relate to steam and describes the basic steam system cycle. Discusses a steam system’s operational components—steam boilers and their accessories and controls; steam system loads, including heat exchangers/converters; and terminal devices. Steam system valves and piping are covered in detail, including common types of piping arrangements; the components of a condensate return/ feedwater system; steam and condensate pipe sizing; and pressure-reducing valves and thermostatic valves.

Retail Refrigeration System (15 Hours)
Trainee $20
(Module ID 03304) Covers the applications, principles, and troubleshooting of retail refrigeration systems.

Customer Relations (5 Hours)
Trainee $20
(Module ID 03316) Presents the importance of establishing good relations with customers and provides guidance on how to achieve that goal. Focuses on ways for a technician to make a good first impression and describes how to communicate in a positive manner with customers. The elements of a service call and dealing with different types of problem customers are also covered.

Water Treatment (10 Hours)
Trainee $20
(Module ID 03308) Explains water problems encountered in heating and cooling systems and identifies water treatment methods and equipment. Covers basic water testing procedures and chemistry.

Indoor Air Quality (12.5 Hours)
Trainee $20
(Module ID 03403) Defines the issues associated with indoor air quality and its effect on the health and comfort of building occupants. Provides guidelines for performing an IAQ survey and covers the equipment and methods used to monitor and control indoor air quality.

Energy Conservation Equipment (7.5 Hours)
Trainee $20
(Module ID 03404) Covers heat recovery/reclaim devices, as well as other energy recovery equipment used to reduce energy consumption in HVAC systems.

Building Management Systems (12.5 Hours)
Trainee $20
(Module ID 03405) Explains how computers and microprocessors are used to manage zoned HVAC systems. Provides coverage of various network protocols and systems controllers, and introduces trainees to the various means of connection and system interface.

System Air Balancing (15 Hours)
Trainee $20
(Module ID 03402) Covers air properties and gas laws, as well as the use of psychrometric charts. Describes the tools, instruments, and procedures used to balance an air distribution system.

System Startup and Shutdown (15 Hours)
Trainee $20
(Module ID 03406) Presents the procedures for the startup and shutdown of hot water, steam heating, chilled water, and air handling systems. Also covers the startup and shutdown of typical cooling towers and packaged HVAC units. The procedures for both short- and long-term shutdowns are included.

Construction Drawings and Specifications (12.5 Hours)
Trainee $20
(Module ID 03401) Teaches how to interpret drawings used in commercial construction, including mechanical drawings, specifications, shop drawings, and as-built. Explains how to perform takeoff procedures for equipment, fittings, ductwork, and other components.

Heating and Cooling System Design (22.5 Hours)
Trainee $20
(Module ID 03407) Identifies factors that affect heating and cooling loads. Explains the process by which heating and cooling loads are calculated, and how load calculations are used in the selection of heating and cooling equipment. Covers basic types of duct systems and their selection, sizing, and installation requirements.

Commercial/Industrial Refrigeration Systems (20 Hours)
Trainee $20
(Module ID 03408) Expands on the study of product and process refrigeration equipment by describing systems used in cold storage and food processing applications, as well as transportation refrigeration. Various types of defrost systems are covered in detail.

Alternative and Specialized Heating and Cooling Systems (10 Hours)
Trainee $20
(Module ID 03409) Describes alternative devices used to reduce energy consumption, including wood, coal, and pellet-fired systems, waste-oil heaters, geothermal heat pumps, solar heating, in-floor radiant heating, and direct-fired makeup units. Also introduces application-specific computer room environmental and air turnover systems.

Fundamentals of Crew Leadership (22.5 Hours)
Trainee $20
(Module ID 46101) While this module has been designed to assist the recently promoted crew leader, it is beneficial for anyone in management. The course covers basic leadership skills and explains different leadership styles, communication, delegating, and problem solving. Jobsite safety and the crew leader’s role in safety are discussed, as well as project planning, scheduling, and estimating. Includes performance tasks to assist the learning process.

GREEN TOPICS IN HVAC

In the typical American household, heating, cooling, and lighting consumes 67% of all the electricity that’s generated. With buildings being the leading source of greenhouse gas emissions, it is no surprise that HVAC systems have become primary targets in this energy conservation battle. In these four modules, we explore the methods and opportunities for increasing the efficiency of energy use and the quality of air that we breathe. These modules have been individually approved by GBCI for continuing education (CE) under its Credential Maintenance Program. CE hours are included next to the Module titles.

SPIRAL BOUND
Trainee Guide: $65

MODULES
Air Quality Equipment (5 Hours) 03204-07
Indoor Air Quality (10 Hours) 03403-09
Energy Conservation Equipment (10 Hours) 03404-09
Alternative Heating and Cooling Systems (10 Hours) 03409-09
Industrial Coating and Lining Application Specialist

Coating Application (105 Hours)
Trainee $20
(Module ID 69104-09) Covers the application of various coatings, including equipment setup, mixing, and preparation of coatings.

Health and Safety, Debris Management, Containment, and Ventilation (47.5 Hours)
Trainee $20
(Module ID 69105-09) Teaches proper health and safety procedures for operators applying coatings in an industrial workplace. The use of personal protection equipment, debris management, and proper containment and ventilation procedures are discussed.

Surface Preparation (100 Hours)
Trainee $20
(Module ID 69106-09) Explains reasons for surface preparation, standards of preparation, and methods of preparing surfaces. Describes the use of basic equipment as well as cleaning procedures.

Industrial Coatings (15 Hours)
Trainee $20
(Module ID 69103-09) Describes types of coatings, their advantages and disadvantages, applications, and specific preparations required.

Curriculum Notes

• 307.5 Hours
• Published: 2009
• Core Curriculum is not a prerequisite for Industrial Coatings and Lining Application Specialist.
• Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK               ISBN
Trainee Guide: $103  978-0-13-604508-3

NCCER and NACE International, two leading providers of industry education, training, and certification, have joined forces to deliver a comprehensive industrial coating applicator training and certification program. The NCCER/NACE Industrial Coating Applicator Training and Certification Program follows the standard on Industrial Coating and Lining Application Specialist Qualification available from NACE International.

Industrial Coating Safety (30 Hours)
Trainee $20
(Module ID 69201-10) Describes safety standards and regulations, access control, and personal safety equipment and training requirements. Covers safety decision-making procedures.

Corrosion Protection (5 Hours)
Trainee $20
(Module ID 69202-10) Teaches the elements of corrosion in concrete and metals and describes the chemistry of corrosion.

Work Planning and Quality Control (25 Hours)
Trainee $20
(Module ID 69203-10) Explains how to follow and execute a work plan. Covers area and ratio calculations and explains how to determine VOC ratios when adding thinners. Explains the effects of pressure, volume, and temperature on surface preparation and application.

Containment (60 Hours)
Trainee $20
(Module ID 69204-10) Describes the types of containment appropriate to various coating and surface preparation applications, including standards and verification. Also covers containment erection and repair.

Surface Preparation Two (80 Hours)
Trainee $20
(Module ID 69205-10) Explains how to identify the surface condition of common substrates. Provides specific training in surface-preparation equipment. Describes inspection and documentation of test equipment, and processes.

Industrial Coatings Two (20 Hours)
Trainee $20
(Module ID 69206-10) Discusses the physical properties of various coatings, including convertible and nonconvertible types. Also covers basic curing mechanisms and methods of film formation.

Coating Applications Two (100 Hours)
Trainee $20
(Module ID 69207-10) Covers the setup, maintenance, and disassembly of conventional air spray, airless spray, air-assisted airless spray, and HVLP spraying equipment, including testing and documentation. Also covers overcoating and explains how to use wet and dry film thickness gauges.

---

To Order Call: 1-800-922-0579
Stay Connected: www.nccer.org/instructors
Construction Drawings (12.5 Hours)
Trainee S20
(Module ID 40107-07) Introduces plot plans, structural drawings, elevation drawings, as-built drawings, equipment arrangement drawings, P&IDs, isometric drawings, basic circuit diagrams, and detail sheets.

Pumps and Drivers (5 Hours)
Trainee S20
(Module ID 40108-07) Explains centrifugal, rotary, reciprocating, metering, and vacuum pump operation and installation methods, as well as types of drivers. Describes net positive suction head and cavitation.

Valves (5 Hours)
Trainee S20
(Module ID 40109-07) Identifies different types of valves and describes their installation, storage, and handling.

Introduction to Test Instruments (7.5 Hours)
Trainee S20
(Module ID 40110-07) Introduces test equipment for industrial maintenance, including tachometers, pyrometers, strobe meters, voltage testers, and automated diagnostic tools.

Material Handling and Hand Rigging (15 Hours)
Trainee S20
(Module ID 40111-07) Introduces the equipment and techniques of material handling, and describes the procedures for rigging and communicating with riggers.

Mobile and Support Equipment (10 Hours)
Trainee S20
ISBN 978-0-13-614623-0
(Module ID 40112-07) Introduces the safety procedures and methods of operation for motorized support equipment, including forklifts, manlifts, compressors, and generators.

Lubrication (12.5 Hours)
Trainee S20
(Module ID 40113-07) Explains lubrication safety, storage, and classifications. Also explains selecting lubricants, additives, lubrication equipment, and lubricating charts.

Introduction to the National Electrical Code® (5 Hours)
Trainee S20
(Module ID 40202-08) Provides a road map for using the NEC®. Introduces the layout and types of information found within the code book. Allows trainees to practice finding information using an easy-to-follow procedure.

Electrical Theory (15 Hours)
Trainee S20
(Module ID 40203-08) Introduces electrical concepts used in Ohm’s law as applied to DC series circuits. Includes atomic theory, electromagnetic force, resistance, and electric power equations. Introduces series, parallel, and series-parallel circuits. Covers resistive circuits, Kirchhoff’s voltage and current laws, and circuit analysis.

Alternating Current (20 Hours)
Trainee S20
(Module ID 40204-08) Covers transformers, single-phase and three-phase power distribution, capacitors, the theory and operation of induction motors, and the instruments and techniques used in testing AC circuits and components.

E&I Test Equipment (10 Hours)
Trainee S20
(Module ID 40205-08) Focuses on proper selection, inspection, and use of common electrical and instrumentation test equipment, including voltage testers, clamp-on ammeters, ohmmeters, multimeters, phase/motor rotation testers, data recording equipment, field communicators, pressure testers, and dead weight testers. Also covers safety precautions and meter category ratings.

Flow, Pressure, Level, and Temperature (15 Hours)
Trainee S20
(Module ID 40206-08) Presents devices used to measure flow, pressure, level, and temperature, along with their principles of operation.

Process Mathematics (15 Hours)
Trainee S20
(Module ID 40207-08) Covers measurement of mass, weight, pressure, temperature, and flow, conversion of units, and their application to industrial maintenance.

Hand Bending (10 Hours)
Trainee S20
(Module ID 40208-08) Introduces conduit bending and installation. Covers the techniques for using hand-operated and step conduit benders, as well as cutting, reaming, and threading conduit.

Tubing (15 Hours)
Trainee S20
ISBN 978-0-13-604710-0
(Module ID 40209-08) Introduces a variety of tubing, tubing materials, tools, and work practices. Covers proper storage and handling, cutting, deburring, reaming, bending, and flaring of tubing.

Clean, Purge, and Test Tubing and Piping Systems (7.5 Hours)
Trainee S20
(Module ID 40210-08) Presents safe methods for cleaning, purging, blowing down, pressure testing, and leak testing tubing, piping, and hoses used in industrial maintenance.
Instrument Drawings and Documents, Part One (15 Hours)
(Module ID 40211-08) Introduces instrument symbols, abbreviations, and drawings and documents, including instrument indexes, installation detail drawings, location drawings, and control loops.

Conductors and Cables (10 Hours)
(Module ID 40212-08) Focuses on the types and applications of conductors and electrical cabling and covers proper wiring techniques. Stresses the applicable NEC® requirements.

Conductor Terminations and Splices (10 Hours)
(Module ID 40213-08) Describes methods of terminating and splicing conductors of all types and sizes, including preparing and taping conductors.

Distribution Equipment (17.5 Hours)
(Module ID 40305-09) Explains distribution equipment, including grounding, switchboard and ground fault maintenance, transformers, and electrical drawing identification.

Transformer Applications (7.5 Hours)
(Module ID 40306-09) Discusses transformer types, construction, connections, protection, and grounding along with capacitors and rectifiers.

Conductor Selection and Calculation (15 Hours)
Trainee S20 ISBN 978-0-13-604736-0
(Module ID 40307-09) Covers the types of conductors used in wiring systems, including insulation, current-carrying capacity, and temperature ratings.

Temporary Grounding (15 Hours)
Trainee S20 ISBN 978-0-13-604738-4
(Module ID 40308-09) Covers the methods used to eliminate or reduce electrical shock hazards to personnel working on electrical equipment.

Layout and Installation of Tubing and Piping Systems (22.5 Hours)
(Module ID 40309-09) Introduces piping and tubing layout procedures. Explains the steps for creating a hand-sketched isometric drawing that can be applied to a piping and tubing installation. Introduces methods and procedures used to measure, cut, bend, and support piping and tubing.

Machine Bending of Conduit (15 Hours)
Trainee S20 ISBN 978-0-13-604741-4
(Module ID 40310-09) Covers bends in conduit up to six inches. Focuses on mechanical, hydraulic, and electrical benders.

Hydraulic Controls (15 Hours)
Trainee S20 ISBN 978-0-13-604742-1
(Module ID 40311-09) Introduces hydraulic principles and fluids, functions and controls of system devices, hydraulic symbols, and drawings. Covers safety considerations for hydraulic systems, as well as troubleshooting.

Pneumatic Controls (15 Hours)
Trainee S20 ISBN 978-0-13-604739-1
(Module ID 40312-09) Describes principles of atmospheric and compressed air gases, and how compressors transmit and treat compressed (pneumatic) air. Covers pneumatic system symbols, drawings, and system safety. Addresses the functions and control of pneumatic system components and provides guidelines for troubleshooting.

Motor-Operated Valves (15 Hours)
(Module ID 40313-09) Covers motor-driven valves, ranging from small, servo-mechanical actuators to large valves that could only be operated by several people if they were not motor driven. Includes electrical, pneumatic, and hydraulic operators.

MODULES
All of the modules below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

Hazardous Locations (10 Hours)
(Module ID 40301-09) Covers all classes of hazardous locations, including seals, components, and equipment approved for use in various hazardous locations.

Electronic Components (10 Hours)
(Module ID 40302-09) Introduces the principles of electronics and semiconductor theory, components, and applications.

E & I Drawings (10 Hours)
Trainee S20 ISBN 978-0-13-604697-4
(Module ID 40303-09) Explains how to read and interpret piping and instrumentation drawings, loop sheets, flow diagrams, isometrics, and orthographics, in order to identify types of instrumentation and the specifications for installation.

Motor Controls (15 Hours)
Trainee S20 ISBN 978-0-13-604698-1
(Module ID 40304-09) Describes selecting, sizing, and installing motor controllers. Also covers control circuit pilot devices and basic relay logic.

Curriculum Notes
• 182.5 Hours
• Revised: 2009, Third Edition
• Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK ISBN
Trainee Guide: $97 978-0-13-604499-4

INDUSTRIAL MAINTENANCE ELECTRICAL & INSTRUMENTATION TECHNICIAN LEVEL 3

INDUSTRIAL MAINTENANCE ELECTRICAL & INSTRUMENTATION TECHNICIAN LEVEL 4

Stay Connected: www.nccer.org/instructors
Troubleshooting and Commissioning a Loop (10 Hours)
Trainee $20
(Module ID 40406-09) Teaches troubleshooting techniques used to locate problems in control loops, and how to isolate a loop in order to troubleshoot it. Covers commissioning of a loop once it is repaired, loop checked, and calibrated.

Process Control Loops and Tuning (20 Hours)
Trainee $20
(Module ID 40407-09) Describes control loops, devices, and terms. Introduces formulas and their applications to PID control. Offers a theory-based approach to PID control and its application in industrial process control. Addresses open, closed, and visual loop tuning.

Data Networks (15 Hours)
Trainee $20
(Module ID 40408-09) Introduces terms associated with data network devices and computers used in industrial facilities. Explains how data network devices and computers are interconnected for communication purposes. Describes how open connectivity is used in industrial data networks, and explores the hardware devices used in a data highway system.

Programmable Logic Controllers (17.5 Hours)
Trainee $20
(Module ID 40409-09) Introduces the application of PLCs in industrial process control, as well as the binary numbering system used in computer-based control. Covers components of PLCs, including power supplies, I/O modules, processor modules, types of communication bus, and memory.

Industrial Maintenance Electrical & Instrumentation Technician Level 4

Oxyfuel Cutting (17.5 Hours)
Trainee $20
(Module ID 32104-07) Explains the safety requirements for oxyfuel cutting. Identifies oxyfuel cutting equipment and provides instructions for setting up, lighting, and using the equipment. Explains how to perform straight line cutting, piercing, beveling, washing, and gouging.

Gaskets and Packing (10 Hours)
Trainee $20
(Module ID 32105-07) Introduces gaskets and gasket material, packing and packing material, and types of O-ring material. Explains the use of gaskets, packing, and O-rings, and how to fabricate a gasket.

Craft-Related Mathematics (15 Hours)
Trainee $20
(Module ID 32106-07) Explains how to use ratios and proportions, solve basic algebra, area, volume, and circumference problems, and solve for right triangles using the Pythagorean theorem.

Construction Drawings (12.5 Hours)
Trainee $20
(Module ID 32107-07) Introduces plot plans, structural drawings, elevation drawings, as-built drawings, equipment arrangement drawings, P&ID, isometric drawings, basic circuit diagrams, and detail sheets.

Pumps and Drivers (5 Hours)
Trainee $20
(Module ID 32108-07) Explains centrifugal, rotary, reciprocating, metering, and vacuum pump operation and installation methods, as well as types of drivers. Describes net positive suction head and cavitation.

Valves (5 Hours)
Trainee $20
(Module ID 32109-07) Identifies different types of valves and describes their installation as well as valve storage and handling.

Introduction to Test Instruments (7.5 Hours)
Trainee $20
(Module ID 32110-07) Introduces test equipment for industrial maintenance, including tachometers, pyrometers, strobos, multimeters, voltage testers, and automated diagnostic tools.

Material Handling and Hand Rigging (15 Hours)
Trainee $20
(Module ID 32111-07) Introduces the equipment and techniques of material handling, and describes the procedures for rigging and communicating with riggers.

Mobile and Support Equipment (10 Hours)
Trainee $20
(Module ID 32112-07) Introduces the safety procedures and methods of operation for motorized support equipment, including forklifts, personnel lifts, compressors, and generators.

Lubrication (12.5 Hours)
Trainee $20
(Module ID 32113-07) Explains lubrication safety, storage, and classifications. Also explains selecting lubricants, additives, lubrication equipment, and lubricating charts.

Distributed Control Systems (17.5 Hours)
Trainee $20
ISBN 978-0-13-609137-0
(Module ID 40410-09) Describes how DCS was developed by combining the technologies of single loop control, direct digital control, and supervisory control. Covers DCS hardware requirements, how control loops are implemented into a DCS, types of data transmission used in DCS, communication protocols, and human interfaces.

Stay Connected:
www.nccer.org/instructors
Industrial Maintenance Mechanic Level 2 (continued)

Introduction to Piping Components (5 Hours)
(Module ID 32202-07) Introduces chemical, compressed air, fuel oil, steam, and water systems. Explains how to identify piping systems according to color codes.

Copper and Plastic Piping Practices (5 Hours)
(Module ID 32203-07) Covers the selection, preparation, joining, and support of copper and plastic piping and fittings.

Introduction to Ferrous Metal Piping Practices (5 Hours)
Trainee $20  ISBN 978-0-13-604624-0
(Module ID 32204-07) Covers iron and steel pipe and fittings and provides step-by-step instructions for cutting, threading, and joining ferrous piping.

Identify, Install, and Maintain Valves (10 Hours)
(Module ID 32205-07) Explains how to remove and install threaded and flanged valves, how to replace valve stem O-ring and bonnet gaskets, and how to repack a valve stuffing box. Also discusses the purpose of valve packing.

Hydostatic and Pneumatic Testing (10 Hours)
(Module ID 32206-07) Describes non-destructive and pressure testing of systems and equipment.

Introduction to Bearings (15 Hours)
(Module ID 32207-07) Introduces plain, ball, roller, thrust, guide, flanged, pillow block, and takeup bearings. Discusses bearing materials and designations.

Low-Pressure Steam Systems (10 Hours)
(Module ID 32209-07) Explains the functioning of low-pressure steam systems used in industry.

Distillation Towers and Vessels (20 Hours)
(Module ID 32210-07) Introduces the various types and functioning of distillation towers and vessels, including recovery vessels and condensate processing.

Heaters, Furnaces, Heat Exchangers, Cooling Towers, and Fin Fans (30 Hours)
(Module ID 32211-07) Introduces equipment used to transfer and remove heat from systems in process.

Introduction to Tube Work (10 Hours)
(Module ID 32212-07) Covers the basics of working with heat exchanger and furnace tubing and tube sheets.

Advanced Trade Math (30 Hours)
(Module ID 32301-08) Explains right triangle trigonometry and its use in the trade. Also covers interpolation, equilateral and isosceles triangles and the laws of acute triangles.

Precision Measuring Tools (20 Hours)
(Module ID 32302-08) Explains how to select, inspect, use and care for levels, feeler gauges, calipers, micrometers, height gauges and surface plates, dial indicators, protractors, parallels and gauge blocks, trammels, and pyrometers.

Installing Bearings (20 Hours)
(Module ID 32303-08) Explains how to remove, troubleshoot, and install tapered, thrust, spherical roller, pillow block, and angular contact ball bearings.

Installing Couplings (15 Hours)
(Module ID 32304-08) Identifies various types of couplings, and covers installation procedures using the press-fit method and the interference-fit method. Also covers coupling removal procedures.

Installing Baseplates and Prealignment (30 Hours)
(Module ID 32305-08) Explains how to lay out and install baseplates and soleplates. Describes how to field-verify a plate installation. Covers precision leveling procedures and performing clearance installation. Also describes basic steps for setting motors and pumps.

Setting Conventional Alignment (30 Hours)
(Module ID 32306-08) Covers types of misalignment, aligning couplings using a straightedge and feeler gauge, adjusting parallel and angular alignment, using a dial indicator, and eliminating coupling stress.

Installing Belt and Chain Drives (10 Hours)
(Module ID 32307-08) Covers the sizes, uses, and installation procedures of six types of drive belts and two types of chain drives.

Installing Mechanical Seals (20 Hours)
(Module ID 32308-08) Covers the function and advantages of mechanical seals, identifies parts and types of seals, and includes procedures for removing, inspecting and installing mechanical seals.

Modules All of the modules below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

Advanced Trade Math (30 Hours)
(Module ID 32301-08) Explains right triangle trigonometry and its use in the trade. Also covers interpolation, equilateral and isosceles triangles and the laws of acute triangles.

Precision Measuring Tools (20 Hours)
(Module ID 32302-08) Explains how to select, inspect, use and care for levels, feeler gauges, calipers, micrometers, height gauges and surface plates, dial indicators, protractors, parallels and gauge blocks, trammels, and pyrometers.

Installing Bearings (20 Hours)
(Module ID 32303-08) Explains how to remove, troubleshoot, and install tapered, thrust, spherical roller, pillow block, and angular contact ball bearings.

Installing Couplings (15 Hours)
(Module ID 32304-08) Identifies various types of couplings, and covers installation procedures using the press-fit method and the interference-fit method. Also covers coupling removal procedures.

Setting Conventional Alignment (30 Hours)
(Module ID 32305-08) Explains how to lay out and install baseplates and soleplates. Describes how to field-verify a plate installation. Covers precision leveling procedures and performing clearance installation. Also describes basic steps for setting motors and pumps.

Installing Belt and Chain Drives (10 Hours)
(Module ID 32307-08) Covers the sizes, uses, and installation procedures of six types of drive belts and two types of chain drives.

Installing Mechanical Seals (20 Hours)
(Module ID 32308-08) Covers the function and advantages of mechanical seals, identifies parts and types of seals, and includes procedures for removing, inspecting and installing mechanical seals.

Introductory to Piping Components (5 Hours)
(Module ID 32202-07) Introduces chemical, compressed air, fuel oil, steam, and water systems. Explains how to identify piping systems according to color codes.

Copper and Plastic Piping Practices (5 Hours)
(Module ID 32203-07) Covers the selection, preparation, joining, and support of copper and plastic piping and fittings.

Introduction to Ferrous Metal Piping Practices (5 Hours)
Trainee $20  ISBN 978-0-13-604624-0
(Module ID 32204-07) Covers iron and steel pipe and fittings and provides step-by-step instructions for cutting, threading, and joining ferrous piping.

Identify, Install, and Maintain Valves (10 Hours)
(Module ID 32205-07) Explains how to remove and install threaded and flanged valves, how to replace valve stem O-ring and bonnet gaskets, and how to repack a valve stuffing box. Also discusses the purpose of valve packing.

Hydostatic and Pneumatic Testing (10 Hours)
(Module ID 32206-07) Describes non-destructive and pressure testing of systems and equipment.

Introduction to Bearings (15 Hours)
(Module ID 32207-07) Introduces plain, ball, roller, thrust, guide, flanged, pillow block, and takeup bearings. Discusses bearing materials and designations.

Low-Pressure Steam Systems (10 Hours)
(Module ID 32209-07) Explains the functioning of low-pressure steam systems used in industry.

Distillation Towers and Vessels (20 Hours)
(Module ID 32210-07) Introduces the various types and functioning of distillation towers and vessels, including recovery vessels and condensate processing.

Heaters, Furnaces, Heat Exchangers, Cooling Towers, and Fin Fans (30 Hours)
(Module ID 32211-07) Introduces equipment used to transfer and remove heat from systems in process.

Introduction to Tube Work (10 Hours)
(Module ID 32212-07) Covers the basics of working with heat exchanger and furnace tubing and tube sheets.
Troubleshooting and Repairing Gearboxes (20 Hours)
Trainee $20
(Module ID 32408-09) Describes types and operation of gearboxes, and gearbox diagnostics. Explains how to troubleshoot, remove, and disassemble gearboxes, how to identify gear wear patterns, and how to install and maintain gearboxes.

Advanced Topics

Advanced Towers and Vessels (15 Hours)
Trainee $20
ISBN 978-0-13-610455-1
(Module ID 32501-09) Introduces the basics of reactor and refinery processes, including cat crackers, vacuum, and distillation. Also teaches the use of hydraulic torquing and tensioning equipment.

Troubleshooting and Repairing Conveyors (12.5 Hours)
Trainee $20
(Module ID 32502-09) Describes maintaining and repairing belt, roller, chain, screw, and pneumatic conveyors.

Instrumentation

L1 INSTRUMENTATION

Curriculum Notes

- 187.5 Hours (Includes 72.5 hours of Core Curriculum, which is a prerequisite for Level 1 completion and must be purchased separately. See p. 14 for ordering information.)
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK ISBN
Trainee Guide: $67 978-0-13-383080-4

MODULES

All of the modules listed below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

Instrumentation Safety Practices (12.5 Hours)
Trainee $20
(Module ID 12115-14) Covers precautions for electrical hazards found on the job and teaches the OSHA-mandated lockout/tagout procedure. Identifies safety practices related to potentially hazardous tools and materials.

Hand and Power Tools for Instrumentation (12.5 Hours)
Trainee $20
ISBN 978-0-13-378834-1
(Module ID 12114-14) Explains how to identify, inspect, use, and maintain the various hand and power tools used by instrument fitters and technicians.

Craft-Related Mathematics (10 Hours)
Trainee $20
(Module ID 12119-14) Covers basic concepts of the metric system and the conversion of English units to metric units. Also reviews basic algebra, geometric figures, and calculations associated with triangles.

Instrument Drawings and Documents Part One (7.5 Hours)
Trainee $20
(Module ID 12107-14) Identifies and describes the types of drawings used in instrumentation work and familiarizes trainees with basic instrument symbols, lines, and abbreviations used on drawings.

Inspect, Handle, and Store Instrumentation Materials (2.5 Hours)
Trainee $20
(Module ID 12304-14) Covers the methods used in receiving, inspecting, handling, and storing project-related instrumentation equipment.

Electrical Systems for Instrumentation (12.5 Hours)
Trainee $20
(Module ID 12116-14) Covers basic electrical concepts and terms, DC circuit calculations, electrical measuring instruments, and electrical wiring.

Fasteners (7.5 Hours)
Trainee $20
(Module ID 12106-14) Explains how to properly identify, select, and install threaded and non-threaded fasteners and anchors used in instrumentation work.

Gaskets, O-Rings, and Packing (10 Hours)
Trainee $20
(Module ID 12108-14) Teaches how to recognize, select, and properly install gaskets, packing, and O-rings. Covers the various materials used in gaskets and O-rings, along with their applications and limitations.

L2 INSTRUMENTATION

Curriculum Notes

- 182.5 Hours
- Revised: 2016, Third Edition
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK ISBN
Trainee Guide: $97 978-0-13-413101-6

To Order Call: 1-800-922-0579
Stay Connected: www.nccer.org/instructors
Instrumentation Level 2 (continued)

**MODULES**
All of the modules listed below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

**Temperature, Pressure, Level, and Flow** (15 Hours)
Trainee $20
(Module ID 12110-15) Introduces the characteristics of temperature, pressure, level, and flow, and describes the units of measure for each variable. Introduces common devices used to measure these process variables and the basic principles of operation for each device.

**Instrument Fitter’s Math** (15 Hours)
Trainee $20
(Module ID 12301-15) Discusses the application of right triangles in bending and installing tubing and conduit as it applies to instrumentation. Shows how to use a scientific calculator in applying instrumentation piping and fitting math.

**Instrument Drawings and Documents, Part Two** (17.5 Hours)
Trainee $20
(Module ID 12202-15) Covers reading and interpreting piping and instrumentation drawings, loop sheets, flow diagrams, isometrics, and orthographics to enable the identification of types of instrumentation and the specifications for installation.

**Test Equipment** (10 Hours)
Trainee $20
(Module ID 12212-15) Explains the selection of instruments to be panel-mounted, locating the instruments using drawings, and procedures for installing the instruments in the panels.

**Installing Field-Mounted Instruments** (25 Hours)
Trainee $20
(Module ID 12213-15) Covers selection and mounting of instruments at locations other than panels, including stand mounting, in-line mounting, structure mounting, strap mounting, and insertion mounting.

**Raceways for Instrumentation** (17.5 Hours)
Trainee $20
(Module ID 12214-15) Introduces raceways. Also covers identification and selection of conduit, raceways, wireways, cable trays, fittings, and NEC® requirements for installation.

**Clean, Purge, and Test Tubing and Piping Systems** (10 Hours)
Trainee $20
(Module ID 12303-15) Presents safe methods for cleaning, purging, blowing down, pressure testing, and leak testing tubing, piping, and hoses used in instrumentation.

**Protective Measures for Instrumentation** (20 Hours)
Trainee $20
(Module ID 12308-15) Covers protective measures applied in instrumentation installations, including heat tracing, chemical treatment, and insulation.

**Layout and Installation of Tubing and Piping Systems** (25 Hours)
Trainee $20
(Module ID 12302-15) Introduces piping and tubing layout procedures. Explains the steps in creating a hand-drawn isometric drawing that can be applied in the piping and tubing installation. Introduces methods and procedures used to measure, cut, and bend support piping and tubing.

**Instrument Air Filters, Regulators, and Dryers** (7.5 Hours)
Trainee $20
(Module ID 12210-15) Presents the construction, operation, and uses of filters, regulators, and dryers. Covers identification and selection of the correct component for installation using applicable specifications and schematics.

**Curriculum Notes**
- 150 Hours
- Revised: 2016, Third Edition
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

**PAPERBACK**
Trainee Guide: $97

**Switches and Photoelectric Devices** (10 Hours)
Trainee $20
(Module ID 12209-16) Covers the principles of operation and applications of switches and photoelectric devices in the instrumentation environment.

**Terminating Conductors** (20 Hours)
Trainee $20
(Module ID 12307-16) Explains the methods, procedures, and standards used to terminate and test common types of conductors utilized in electrical and electronic wiring applications.

**Grounding and Shielding of Instrumentation Wiring** (10 Hours)
Trainee $20
ISBN 978-0-13-448291-0
(Module ID 12306-16) Teaches the basic concepts of grounding and shielding, including wire and cable identification. Defines various types of noise that can be induced into instrumentation wiring and describes the methods used to reduce or eliminate it.

**Process Control Theory** (25 Hours)
Trainee $20
(Module ID 12204-16) Describes the principles of process control and how various types of control loops are applied. Discusses ON-OFF and modulating control schemes. Explains how process control principles are applied to flow, level, temperature, and pressure control loops.

**Controllers** (10 Hours)
Trainee $20
(Module ID 12206-16) Covers the theory of operation and the application of common process controllers, including both pneumatic and electronic devices.

**Countries**
- 165 Hours
- Revised: 2016, Third Edition
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

**PAPERBACK**
Trainee Guide: $97

**MODULES**
All of the modules listed below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

**Control Valves, Actuators, and Positioners** (15 Hours)
Trainee $20
(Module ID 12207-16) Covers the construction and operation of various piping-system valves and actuators. Discusses the application and operation of valve positioners. Presents valve selection criteria and explains how to interpret valve and actuator markings and nameplate information.

**Detectors, Secondary Elements, Transducers, and Transmitters** (25 Hours)
Trainee $20
(Module ID 12205-16) Introduces instrumentation devices that detect different process variables, devices that change the variable into a transmittable form, and devices that transmit the information to another device for control or informational purposes. Covers devices that sense flow, level, temperature, and pressure, along with various types of transducers and transmitters.

**Instrumentation Electrical Circuity** (25 Hours)
Trainee $20
(Module ID 12305-16) Describes various types of series and parallel circuits; resistance, inductance, and capacitance in AC circuits; DC power supplies; analog and digital signals; and common applications of electrical and electronic circuitry.

**Relays and Timers** (10 Hours)
Trainee $20
(Module ID 12208-16) Presents the principles of operation and applications of various relays and timers. Also reviews the selection process for these devices.
Instrumentation Level 4 (continued)

Proving, Commissioning, and Troubleshooting a Loop (17.5 Hours)
(Module ID 124010-16) Explains the stages in readying a loop for operation: checking, proving, and commissioning. Examines the key ideas behind each step and stresses the differences. Explores troubleshooting techniques and methodologies, with an emphasis on their use during the three stages of readying a loop.

Tuning Loops (15 hours)
(Module ID 12405-16) Introduces the techniques used in tuning loops employing PID control. Includes basic tuning theory and formulas. Examines open, closed, and visual loop tuning methods.

Digital Logic Circuits (15 Hours)
Trainee $20  ISBN 978-0-13-448305-4
(Module ID 12401-16) Introduces the basic ideas of digital electronics. Presents gates, combination logic, and truth tables. Addresses memory devices, counters, and arithmetic circuits as well as the numbering systems commonly used in digital systems.

Programmable Logic Controllers (12.5 Hours)
(Module ID 12406-16) Introduces PLCs and their uses in industrial control. Includes hardware components, applications, communications, number systems, and programming methods.

Trainee $20

Distributed Control Systems (15 Hours)
(Module ID 12407-16) Surveys DCS technologies, including an overview of their development. Discusses key components, fieldbus, servers, and human-machine interfaces. Also introduces maintenance and the increasingly important aspect of DCS security.

Trainee $20

Analyzers and Monitors (30 hours)
(Module ID 12409-16) Introduces the key concepts of chemistry, with an emphasis on their application in instrumentation. Explains crucial physical and chemical properties of matter. Discusses the different analytical methods used in industry to assess processes. Includes pH, conductivity, ORP, gas analysis, and particulate counts. Explores specific instruments and techniques.

Trainee $20

Ironworking

L1 IRONWORKING
LEVEL 1

Tools and Equipment of the Trade (10 Hours)
(Module ID 30103-11) Identifies safety tools and equipment. Describes the proper use of hand and power tools. Identifies power sources for ironworking tools.

Fastening (5 Hours)
(Module ID 30104-11) Explains how to recognize A-325 and A-490 bolts, washers, and nuts. Describes how to correctly tension bolts and explains procedures for calibrated wrench and turn-of-nut tightening methods.

Mobile Construction Cranes (10 Hours)
(Module ID 30105-11) Identifies common lifting equipment and construction cranes. Describes how to use crane manuals, perform record keeping, and follow safety requirements. Provides procedures for assembling construction cranes.

Rigging Equipment (10 Hours)
(Module ID 30106-11) Describes the use and inspection of equipment and hardware used in rigging. Describes slings and explains how to determine sling capacities and angles. Covers the selection and inspection of rigging equipment, including block and tackles, chain hoists, come-alongs, jacks, and tuggers.

Rigging Practices (15 Hours)
(Module ID 30107-11) Identifies the site and environmental hazards associated with rigging. Explains how to attach rigging hardware for routine lifts and identify the components of a lift description. Describes how to perform sling tension calculations and determine the weight of beams and basic weight estimation.

Trade Drawings One (12.5 Hours)
(Module ID 30108-11) Identifies the materials used in steel-framed buildings. Explains how to read basic structural blueprints.

Structural Ironworking One (7.5 Hours)
(Module ID 30109-11) Identifies the types of construction that utilize structural steel, the components of the structures, and the process involved in erecting a steel structure. Explains the principles of structural stresses and the requirements of bolted connections.

Plumbing, Aligning, and Guying (5 Hours)
(Module ID 30110-11) Describes the purpose and function of aligning and plumbing steel structures, the tools that are used, and the procedures for performing the plumbing and aligning. Identifies and explains column base and baseplate components and foundation failures.

Oxyfuel Cutting (17.5 Hours)
(Module ID 30112-11) Identifies welding equipment and processes. Describes safety precautions associated with arc welding. Explains how to identify weld joints, their dimensions, and applications from welding symbols and drawings. Describes how to set up and use SMAW equipment and explains the governing welding codes.

Introduction to Arc Welding (22.5 Hours)
(Module ID 30113-11) Identifies welding equipment and processes. Describes safety precautions associated with arc welding. Explains how to identify weld joints, their dimensions, and applications from welding symbols and drawings. Describes how to set up and use SMAW equipment and explains the governing welding codes.

Bar Joists and Girders (5 Hours)
(Module ID 30113-11) Identifies the types of construction that utilize structural steel, the components of the structures, and the process involved in erecting a steel structure. Explains the principles of structural stresses and the requirements of bolted connections.

Metal Decking (10 Hours)
(Module ID 30114-11) Identifies the types of construction that utilize structural steel, the components of the structures, and the process involved in erecting a steel structure. Explains the principles of structural stresses and the requirements of bolted connections.
Ironworking Level 1 (continued)

**Field Fabrication** (15 Hours)
(Module ID 30115-11) Identifies the safety hazards associated with field fabrication. Describes how to use common layout tools. Explains how to fabricate angle iron, channel, T-shapes, and W-shapes to given dimensions.

**Steel Joists and Joist Girders** (15 Hours)
(Module ID 30206-11) Identifies the types of joists, methods of end support, and the types of bridging available. Explains how to locate the ironworking information on framing plans and describes steel joist installation procedures. Describes the conditions necessary and the benefits of panelizing bar joist.

**Tower Cranes** (15 Hours)
(Module ID 30207-11) Describes safe practices when erecting steel using tower cranes. Explains the difference between erecting steel with a mobile crane versus a tower crane. Describes tower crane hand and verbal signals.

**Survey Equipment Use and Care One** (10 Hours)
(Module ID 30208-11) Identifies survey equipment and uses. Explains the proper set up and use of a builder’s level and a theodolite. Covers how to shoot elevations, sweep a column for plumb, and set up over a point and back sight to another point.

**Structural Ironworking Two** (30 Hours)
(Module ID 30205-11) Describes pre-erection activities for structural steel. Provides procedures for erecting bearing devices, columns, beams, girders, joists, bracing, and bridging.

**Pre-Engineered Systems** (10 Hours)
(Module ID 30302-12) Identifies the structural components and accessories of metal buildings and describes their installation. Describes the pre-erection and erection procedures that apply to their installation and the safety precautions associated with their installation.

**Steel Joists and Joist Girders** (15 Hours)
(Module ID 30206-11) Identifies the types of joists, methods of end support, and the types of bridging available. Explains how to locate the ironworking information on framing plans and describes steel joist installation procedures. Describes the conditions necessary and the benefits of panelizing bar joist.

**Tower Cranes** (15 Hours)
(Module ID 30207-11) Describes safe practices when erecting steel using tower cranes. Explains the difference between erecting steel with a mobile crane versus a tower crane. Describes tower crane hand and verbal signals.

**Survey Equipment Use and Care One** (10 Hours)
(Module ID 30208-11) Identifies survey equipment and uses. Explains the proper set up and use of a builder’s level and a theodolite. Covers how to shoot elevations, sweep a column for plumb, and set up over a point and back sight to another point.

**Structural Ironworking Two** (30 Hours)
(Module ID 30205-11) Describes pre-erection activities for structural steel. Provides procedures for erecting bearing devices, columns, beams, girders, joists, bracing, and bridging.

**Pre-Engineered Systems** (10 Hours)
(Module ID 30302-12) Identifies the structural components and accessories of metal buildings and describes their installation. Describes the pre-erection and erection procedures that apply to their installation and the safety precautions associated with their installation.
**Masonry**

**MODULES**

<table>
<thead>
<tr>
<th>Levels</th>
<th>Module ID</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>28101-13</td>
<td>Basic Masonry (10 Hours)</td>
</tr>
<tr>
<td></td>
<td>28102-13</td>
<td>Masonry Reinforcements and Accessories (10 Hours)</td>
</tr>
<tr>
<td></td>
<td>28103-13</td>
<td>Masonry Openings and Metalwork (10 Hours)</td>
</tr>
<tr>
<td></td>
<td>28104-13</td>
<td>Masonry Admixtures (10 Hours)</td>
</tr>
<tr>
<td></td>
<td>28105-13</td>
<td>Masonry Effect of Climate on Masonry (10 Hours)</td>
</tr>
<tr>
<td></td>
<td>28106-13</td>
<td>Masonry Advanced Laying Techniques (10 Hours)</td>
</tr>
<tr>
<td></td>
<td>28107-13</td>
<td>Masonry Specialized Materials and Techniques (10 Hours)</td>
</tr>
<tr>
<td>L2</td>
<td>28201-14</td>
<td>Residential Masonry (15 Hours)</td>
</tr>
<tr>
<td></td>
<td>28202-14</td>
<td>Masonry Specialized Materials and Techniques (15 Hours)</td>
</tr>
<tr>
<td></td>
<td>28203-14</td>
<td>Masonry Elevating Masonry (15 Hours)</td>
</tr>
<tr>
<td></td>
<td>28204-14</td>
<td>Masonry Refractory Masonry (15 Hours)</td>
</tr>
<tr>
<td></td>
<td>28205-14</td>
<td>Masonry Repair and Restoration (15 Hours)</td>
</tr>
</tbody>
</table>

**ISBN**

- Trainee Guide: $20
- Trainee Guide: $25

**Curriculum Notes**

- All of the modules listed below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.
- **Introduction to Masonry (12.5 Hours)**
  - Trainee $20
- **Masonry Safety (15 Hours)**
  - Trainee $20
- **Masonry Tools & Equipment (15 Hours)**
  - Trainee $20
- **Measurements, Drawings, and Specifications (10 Hours)**
  - Trainee $20
- **Mortar (10 Hours)**
  - Trainee $20
- **Masonry Units and Installation Techniques (60 Hours)**
  - Trainee $20
- **Residential Plans and Drawing Interpretation (12.5 Hours)**
  - Trainee $20
- **Residential Masonry (25 Hours)**
  - Trainee $20
- **Reinforced Masonry (20 Hours)**
  - Trainee $20
- **Masonry Openings and Metalwork (20 Hours)**
  - Trainee $20
- **Advanced Laying Techniques (40 Hours)**
  - Trainee $20
- **Effects of Climate on Masonry (20 Hours)**
  - Trainee $20
- **Construction Inspection and Quality Control (15 Hours)**
  - Trainee $20
- **Elevated Masonry (15 Hours)**
  - Trainee $20
- **Specialized Materials and Techniques (60 Hours)**
  - Trainee $20
- **Repair and Restoration (20 Hours)**
  - Trainee $20

**PAPERBACK**

- Trainee Guide: $97
## Mechanical Insulating

### Orientation to the Trade (5 Hours)
- **Trainee:** $20
- **Module ID:** 19101-18
- **ISBN:** 978-0-13-448313-9
- Provides an overview of the insulation industry, including how and why insulation is used, safety factors related to insulation, and common insulation-specific tools.

### Material Handling, Storage, and Distribution (2.5 Hours)
- **Trainee:** $20
- **Module ID:** 19104-18
- **ISBN:** 978-0-13-448314-6
- Covers receiving, stacking, and storage of insulation materials, as well as material movement on the jobsite.

### Characteristics of Pipe (5 Hours)
- **Trainee:** $20
- **Module ID:** 19105-18
- **ISBN:** 978-0-13-448318-4
- Provides an overview of different pipe types and their uses, pipe sizing methodology, and the relationship between pipe sizes and insulation sizes.

### Plumbing Systems (7.5 Hours)
- **Trainee:** $20
- **Module ID:** 19209-18
- **ISBN:** 978-0-13-448319-1
- Covers cold and hot water plumbing systems and insulation requirements for different types of plumbing systems.

### Chilled and Hot Water Heating Systems (5 Hours)
- **Trainee:** $20
- **Module ID:** 19210-18
- **ISBN:** 978-0-13-448321-4
- Covers chilled and hot water heating and dual temperature systems, including the types of pipe and equipment common to each type of system. Explains the types of insulation required by each type of system.

### Insulating Pipe Fittings, Valves, and Flanges (40 Hours)
- **Trainee:** $20
- **Module ID:** 19107-18
- **ISBN:** 978-0-13-448326-9
- Explores insulation requirements for fittings, valves, and flanges. Provides tips for professional and economical installation.

### Blanket Insulation for Ducts (7.5 Hours)
- **Trainee:** $20
- **Module ID:** 19302
- **ISBN:** 978-0-13-489678-6
- Covers the identification of various duct systems and their associated components.

### Board Insulation for Ducts (20 Hours)
- **Trainee:** $20
- **Module ID:** 19203
- **ISBN:** 978-0-13-489775-0
- Covers fiberglass board insulation applications, such as cutting fiberglass board insulation to fit over standing seams and stiffeners, vapor-seal applications, and cutting and installing fiberglass board insulation on round or oval ducts.
### L3 MECHANICAL INSULATING

#### Curriculum Notes
- **LEVEL 3**
- **152.5 Hours**
- Updated in 2018.

#### MODULES

**All of the modules below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.**

<table>
<thead>
<tr>
<th>Module Title</th>
<th>ISBN</th>
<th>Trainee Guide:</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Industrial Boiler Systems</strong></td>
<td>978-0-13-498757-6</td>
<td>$97</td>
<td>7.5</td>
</tr>
<tr>
<td><strong>Mineral Wool Insulation</strong></td>
<td>978-0-13-498755-2</td>
<td>$97</td>
<td>12.5</td>
</tr>
<tr>
<td><strong>Steam and Process Water Systems</strong></td>
<td>978-0-13-498753-8</td>
<td>$97</td>
<td>17.5</td>
</tr>
<tr>
<td><strong>Vapor Retarders and Insulation Coatings</strong></td>
<td>978-0-13-498752-1</td>
<td>$97</td>
<td>10</td>
</tr>
<tr>
<td><strong>Rigid Foam and Cellular Glass Insulation</strong></td>
<td>978-0-13-498751-0</td>
<td>$97</td>
<td>12.5</td>
</tr>
<tr>
<td><strong>Jacketing Systems</strong></td>
<td>978-0-13-498749-1</td>
<td>$97</td>
<td>12.5</td>
</tr>
<tr>
<td><strong>Removable and Reusable Flexible Insulation Covers</strong></td>
<td>978-0-13-498740-8</td>
<td>$97</td>
<td>12.5</td>
</tr>
<tr>
<td><strong>Specialized Insulation Systems</strong></td>
<td>978-0-13-498739-2</td>
<td>$97</td>
<td>12.5</td>
</tr>
<tr>
<td><strong>Fundamentals of Crew Leadership</strong></td>
<td>978-0-13-487188-2</td>
<td>$97</td>
<td>22.5</td>
</tr>
<tr>
<td><strong>Orientation to the Trade</strong></td>
<td>978-0-13-613078-9</td>
<td>$97</td>
<td>5</td>
</tr>
<tr>
<td><strong>Millwright Hand Tools</strong></td>
<td>978-0-13-229009-8</td>
<td>$97</td>
<td>15</td>
</tr>
<tr>
<td><strong>Fasteners and Anchors</strong></td>
<td>978-0-13-229010-4</td>
<td>$97</td>
<td>10</td>
</tr>
</tbody>
</table>
Basic Layout (20 Hours)
(Module ID 15104-06) Discusses the tools used in layout. Explains how to lay out baselines using the arc method and 3-4-5 method.

Gaskets and O-Rings (10 Hours)
(Module ID 15105-06) Describes gaskets and O-rings and their applications. Provides instructions for laying out, cutting, and installing gaskets.

Oxyfuel Cutting (15 Hours)
(Module ID 15106-06) Explains the safety requirements for oxyfuel cutting. Identifies oxyfuel cutting equipment and provides instructions for setting up, lighting, and using the equipment. Describes how to perform straight line cutting, piercing, beveling, washing, and gouging.

L2 MILLWRIGHT

Curriculum Notes
• 150 Hours
• Revised: 2007, Third Edition
• Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK  ISBN
Trainee Guide: $97  978-0-13-227292-6

MODULES
All of the modules below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

Intermediate Trade Math (20 Hours)
(Module ID 15201-07) Explains how to use tables of equivalents and conversion tables, figure ratios and proportions, perform right angle trigonometry, calculate take-outs using trigonometry, and calculate volumes and weights of objects.

Field Sketching (10 Hours)
(Module ID 15202-07) Teaches the basic skills needed to make a good field sketch to convey information about how parts should be made or assembled.

Intermediate Blueprint Reading (20 Hours)
(Module ID 15203-07) Explains orthographic projection, isometric, and schematic drawings used to show piping, hydraulic, and pneumatic systems.

Specialty Tools (10 Hours)
(Module ID 15204-07) Explains how to select, inspect, and maintain torque multipliers, cable cutters, nut splitters, keyseat rules, zero-to-one micrometers, and various gauges.

Millwright Power Tools (20 Hours)
(Module ID 15205-07) Introduces power tools used by millwrights and procedures for using, caring for, and maintaining these tools.

Rigging (20 Hours)
(Module ID 15206-07) Explains how to select, inspect and use rigging equipment, how to determine requirements and plan lifts, and how to communicate with crane operators.

Setting Baseplates and Soleplates (15 Hours)
(Module ID 15207-07) Explains procedures for setting machine baseplates and soleplates, and aligning them with other equipment.

Lubrication (20 Hours)
(Module ID 15208-07) Explains how to safely select and use lubricants. Describes types of lubricants and lubrication devices.

Introduction to Bearings (15 Hours)
(Module ID 15209-07) Describes the types and applications of bearings, including plain, roller, ball, thrust and guide bearings, as well as pillow block, flanged, and takeaway bearings. Also explains bearing designation systems.

Installing Seals (5 Hours)
(Module ID 15300-08) Covers the applications, removal, and installation procedures using the interference-fit method. Also covers coupling removal procedures.

Installing Mechanical Seals (20 Hours)
(Module ID 15305-08) Covers the function and advantages of mechanical seals, identifies parts and types of seals, and includes procedures for removing, inspecting, and installing mechanical seals.

Removing and Installing Bearings (20 Hours)
(Module ID 15306-08) Explains how to remove, troubleshoot, and install tapered, thrust, spherical roller, pillow block, and angular contact ball bearings.

Couplings (15 Hours)
(Module ID 15307-08) Identifies types of couplings and covers installation procedures using the press-fit method and the interference-fit method. Also covers coupling removal procedures.

Fabricating Shims (5 Hours)
(Module ID 15308-08) Describes types of shim stock and materials and explains the procedures for fabricating shims.

Alignment Fixtures and Specialty Jigs (10 Hours)
(Module ID 15309-08) Explains the applications and fabrication procedures for angle iron, chain, complex reverse-indicator, Christmas tree, and piano wire jigs.

Presalignment for Equipment Installation (15 Hours)
(Module ID 15310-08) Explains how to level equipment using jack bolts, wedges, and shims. Covers precision leveling procedures and performing clearance installation. Also describes basic steps for setting motors and pumps.

Installing Belt and Chain Drives (10 Hours)
(Module ID 15311-08) Covers the sizes, uses, and installation procedures of six types of drive belts and two types of chain drives.

Installing Fans and Blowers (10 Hours)
(Module ID 15312-08) Explains how to install axial-flow fans, centrifugal fans, and root-type and screw-type blowers.

L3 MILLWRIGHT

Curriculum Notes
• 160 Hours
• Revised: 2008, Third Edition
• Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK  ISBN
Trainee Guide: $97  978-0-13-614431-1

MODULES
All of the modules below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

Advanced Trade Math (20 Hours)
(Module ID 15301-08) Explains right triangle trigonometry and its use in the trade. Also covers interpolation, equilateral and isoceles triangles, and the laws of acute triangles.

Precision Measuring Tools (20 Hours)
(Module ID 15302-08) Explains how to select, inspect, use and care for levels, calipers, micrometers, height gauges and surface plates, dial indicators, protractors, parallels and gauge blocks, trammels, and pyrometers.

Installing Packing (10 Hours)
(Module ID 15303-08) Explains the types of packing and packing materials found in a typical stuffing box. Covers how to remove packing and how to install compression packing and lap-type packing.

Installing Seals (5 Hours)
(Module ID 15304-08) Covers the applications, removal, and installation procedures for dynamic and static seals, and lip, cup, oil, and labyrinth seals.

L4 MILLWRIGHT

Curriculum Notes
• 150 Hours
• Revised: 2008, Third Edition
• Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK  ISBN
Trainee Guide: $97  978-0-13-604506-9

MODULES
All of the modules below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.
Conveyors (5 Hours)
Trainee $20  
(Module ID 15401-08) Describes conveyor systems and their principles of operation.

Troubleshooting and Repairing Conveyors (12.5 Hours)
Trainee $20  
(Module ID 15402-08) Discusses maintaining and repairing belt, roller, chain, screw, and pneumatic conveyors.

Conventional Alignment (30 Hours)
Trainee $20  
(Module ID 15403-08) Explains the procedures involved in aligning shafts, first with a straightedge and feeler gauges, then with dial indicators.

Pumps (20 Hours)
Trainee $20  
(Module ID 15404-08) Describes common pumps and their principles of operation. Explains centrifugal, rotary, reciprocating and metering pumps. Describes net positive suction head and cavitation.

Troubleshooting and Repairing Pumps (7.5 Hours)
Trainee $20  
(Module ID 15405-08) Describes inspecting, troubleshooting, assembling, and disassembling pumps. Explains installing pumps, and preparing them for startup. Discusses shutdown, repair, and removal of pumps from the system.

Compressors and Compressor Maintenance (20 Hours)
Trainee $20  
(Module ID 15406-08) Introduces compressors and the troubleshooting and maintenance procedures associated with compressors.

Basic Pneumatic Systems (7.5 Hours)
Trainee $20  
(Module ID 15407-08) Explains pneumatic system components and compressed-air treatment. Introduces equipment auxiliary and special-application equipment used with compressors and with tools.

Troubleshooting and Repairing Pneumatic Equipment (10 Hours)
Trainee $20  
(Module ID 15408-08) Explains repair and maintenance of pneumatic system components. Describes troubleshooting processes and methods, including pressure sensors and flow sensors.

Basic Hydraulic Systems (10 Hours)
Trainee $20  
(Module ID 15409-08) Describes principles and types of hydraulic equipment and related safety procedures. Describes applications of hydraulic equipment.

Troubleshooting and Repairing Hydraulic Equipment (7.5 Hours)
Trainee $20  
(Module ID 15410-08) Explains inspecting hydraulic systems, diagnosing problems, and repairing these systems. Shows how to read hydraulic schematic symbols.

Troubleshooting and Repairing Gearboxes (20 Hours)
Trainee $20  
(Module ID 15411-08) Describes types and operation of gearboxes, and gearbox diagnostics. Explains how to troubleshoot, remove, and disassemble gearboxes; how to identify gear wear patterns; and how to install and maintain gearboxes.

Advanced Blueprint Reading (25 Hours)
Trainee $20  
ISBN 978-0-13-610494-0  
(Module ID 15503-09) Describes the use of drawing sets to obtain information about a system. Explains the process of identifying a part of a machine for repair or replacement from a set of drawings.

Optical Alignment (25 Hours)
Trainee $20  
(Module ID 15504-09) Explains how to use theodolites, optical levels, auto levels, and total stations to place and align equipment.

Turbines (20 Hours)
Trainee $20  
ISBN 978-0-13-610496-4  
(Module ID 15505-09) Describes types of turbines and their components. Describes the operation and common applications of particular types, including gas, steam, and water turbines.

Maintaining and Repairing Turbine Components (15 Hours)
Trainee $20  
(Module ID 15506-09) Describes the process of inspecting and repairing key components of turbines. Explains the guidelines for maintaining large steam turbines.

Installing Electric Motors (10 Hours)
Trainee $20  
(Module ID 15507-09) Describes different types of electric motors, and presents basic guidelines for the installation of motors.

Preventive and Predictive Maintenance (10 Hours)
Trainee $20  
(Module ID 15508-09) Explains preventive and predictive maintenance programs. Provides information on nondestructive testing, and introduces the basic techniques for NDE. Lubricant analysis, and acoustic, infrared, and vibration testing are also discussed.

Vibration Analysis (5 Hours)
Trainee $20  
ISBN 978-0-13-610506-0  
(Module ID 15509-09) Explains the causes of vibration and the procedures and types of equipment used in vibration analysis. Describes the equipment used for vibration testing and monitoring. Describes field machine balancing.
TO ORDER CALL: 1-800-922-0579 www.nccer.org/instructors

Stay Connected: www.nccer.org/instructors
### Painting Level 3 (continued)

**Coatings**

**Coatings Three** (15 Hours)
Trainee $20
(Module ID 07303) Describes unique properties, safety and health considerations, surface preparation, application, and testing, and inspection of high-performance coatings used primarily to protect substrates for commercial or light industrial applications.

**Color and Tinting** (10 Hours)
Trainee $20
(Module ID 07304) Presents the theory and definition of color. Describes procedures for mixing, tinting, and matching colors. The use of the color wheel and the Munsell, Federal Standard 595B, and other color systems are also explained.

**Decorative (Faux) Finishes** (22.5 Hours)
Trainee $20
(Module ID 07305) Describes techniques for glazing, antiquing, stippling, motting, gilding, marbling, and graining decorative finishes.

**Wallcovering** (40 Hours)
Trainee $20
(Module ID 07306) Covers the wallcovering process from start to finish. Includes equipment and materials, estimating methods, surface preparation, adhesives and installation, and failures and remedies.

**Graphics** (12.5 Hours)
Trainee $20
(Module ID 07307) Describes types of graphics and their uses, methods of transferring graphic patterns to a surface, building code regulations, and other factors in the use of graphics.

**Texturing** (10 Hours)
Trainee $20
(Module ID 07308) Explains the characteristics of various texturing materials, surface preparation procedures, and techniques for producing different patterns.

### Pipefitting

**Pipefitting Hand Tools** (20 Hours)
Trainee $20
(Module ID 08102-06) Covers hand tool safety as well as procedures for selecting, inspecting, using, and maintaining hand tools used by pipefitters. Includes pipe wrenches, pipe stands, pipe vises, levels, pipe fabrication tools, pipe bending tools, and pipe joining tools.

**Pipefitting Power Tools** (15 Hours)
Trainee $20
(Module ID 08103-06) Covers power tool safety as well as procedures for selecting, inspecting, using, and maintaining power tools used by pipefitters. Provides guidelines for using electrical and pneumatic tools, including pipe threading machines.

**Oxyfuel Cutting** (17.5 Hours)
Trainee $20
(Module ID 08104-06) Explains the safety requirements for oxyfuel cutting. Identifies oxyfuel cutting equipment and provides instructions for setting up, lighting, and using the equipment. Explains how to perform straight line cutting, piercing, beveling, washing, and gouging.

**Ladders and Scaffolds** (20 Hours)
Trainee $20
(Module ID 08105-06) Describes hazards and safety procedures governing the use of ladders, extension ladders, fixed scaffolds, and rolling scaffolds. Includes general procedures for scaffold assembly and use.

**Motorized Equipment** (10 Hours)
Trainee $20
(Module ID 08106-06) Explains the safety factors, operator maintenance, and operating procedures associated with motorized equipment used on job sites, including electrical generators, air compressors, aerial lifts, pumps, forklifts, and hydraulic cranes.

**Identifying and Installing Valves** (20 Hours)
Trainee $20
(Module ID 08203-06) Identifies types of valves and describes their installation as well as proper storage and handling procedures.

---

**To Order Call:** 1-800-922-0579 www.nccer.org/instructors
Pipefitting Level 2 (continued)

Pipefitting Trade Math (15 Hours)
Trainee $20
(Module ID 08204-06) Explains how to use ratios and proportions, solve basic algebra, area, volume, and circumference problems, and solve for right triangles using the Pythagorean theorem.

Threaded Pipe Fabrication (15 Hours)
Trainee $20
(Module ID 08205-06) Describes the materials used in threaded piping systems. Explains how to determine pipe lengths between threaded pipe fittings, prepare the pipe and fittings for fit-up, and assemble the piping system.

Socket Weld Pipe Fabrication (25 Hours)
Trainee $20
(Module ID 08206-06) Describes the materials used in socket weld piping systems. Explains how to determine pipe lengths between socket weld fittings, prepare the pipe and fittings for fit-up, and fabricate socket weld fittings.

Butt Weld Pipe Fabrication (37.5 Hours)
Trainee $20
(Module ID 08207-06) Describes the materials used in butt weld piping systems. Explains how to determine pipe lengths between butt weld fittings, prepare the pipe and fittings for fit-up, and fabricate butt weld fittings. Also describes how to select and install backing rings, fabricate channel iron welding jigs, and use and care for welding clamps.

Excavations (10 Hours)
Trainee $20
(Module ID 08208-06) Explains the use of shoring materials per OSHA standards. Covers shoring systems, installing a hydraulic vertical shore, determining the overall fall of a sewer line, setting the grade and elevation of a trench, and backfilling.

Underground Pipe Installation (20 Hours)
Trainee $20
(Module ID 08209-06) Explains pipe installation procedures and guidelines, including the procedures for cast iron, ductile iron, concrete, carbon steel, fiberglass, and thermoplastic pipe. Includes an introduction to horizontal directional drilling for pipe installation.

Rigging Equipment (10 Hours)
Trainee $20
(Module ID 08301-07) Describes the use and inspection of basic equipment and hardware used in rigging, including slings, wire rope, chains, and attaching hardware. Explains sling angles. Describes the use of riggers, jacks, hoists, and come-alongs.

Rigging Practices (10 Hours)
Trainee $20
(Module ID 08302-07) Describes basic rigging and crane hazards and related safety procedures. Provides an overview of personnel lifting and lift planning. Introduces crane load charts and load balancing. Includes instructions for rigging and lifting pipe.

Standards and Specifications (7.5 Hours)
Trainee $20
(Module ID 08303-07) Explains how to read and interpret pipefitting standards, codes, and specifications. Describes how to identify pipe and components according to specifications.

Advanced Trade Math (20 Hours)
Trainee $20
(Module ID 08304-07) Discusses the use of equivalent and conversion tables. Explains how to use right angle trigonometry to calculate take-outs.

Motorized Equipment Two (10 Hours)
Trainee $20
(Module ID 08305-07) Covers the applications and safety requirements of drain cleaners, personnel lifts, and cable lifts.

Introduction to Aboveground Pipe Installation (20 Hours)
Trainee $20
(Module ID 08306-07) Identifies various types of pipe, flanges, gaskets, and bolts. Includes step-by-step procedures for installing pipe sleeves and floor penetrations.

Field Routing and Vessel Trim (10 Hours)
Trainee $20
(Module ID 08307-07) Explains how to secure the work area and determine field run specifications, load weights for erection equipment, and support needs. Describes how to erect vessel trim.

Pipe Hangers and Supports (25 Hours)
Trainee $20
(Module ID 08308-07) Explains how to identify, select, and install pipe hangers and supports, including spring can supports.

Testing Piping Systems and Equipment (20 Hours)
Trainee $20
(Module ID 08309-07) Explains how to perform pretests, service flow tests, head pressure tests, hydrostatic tests, and steam blow tests.

Pipefitting Trade Math (15 Hours)
Trainee $20
(Module ID 08204-06) Explains how to use ratios and proportions, solve basic algebra, area, volume, and circumference problems, and solve for right triangles using the Pythagorean theorem.

Threaded Pipe Fabrication (15 Hours)
Trainee $20
(Module ID 08205-06) Describes the materials used in threaded piping systems. Explains how to determine pipe lengths between threaded pipe fittings, prepare the pipe and fittings for fit-up, and assemble the piping system.

Socket Weld Pipe Fabrication (25 Hours)
Trainee $20
(Module ID 08206-06) Describes the materials used in socket weld piping systems. Explains how to determine pipe lengths between socket weld fittings, prepare the pipe and fittings for fit-up, and fabricate socket weld fittings.

Butt Weld Pipe Fabrication (37.5 Hours)
Trainee $20
(Module ID 08207-06) Describes the materials used in butt weld piping systems. Explains how to determine pipe lengths between butt weld fittings, prepare the pipe and fittings for fit-up, and fabricate butt weld fittings. Also describes how to select and install backing rings, fabricate channel iron welding jigs, and use and care for welding clamps.

Excavations (10 Hours)
Trainee $20
(Module ID 08208-06) Explains the use of shoring materials per OSHA standards. Covers shoring systems, installing a hydraulic vertical shore, determining the overall fall of a sewer line, setting the grade and elevation of a trench, and backfilling.

Underground Pipe Installation (20 Hours)
Trainee $20
(Module ID 08209-06) Explains pipe installation procedures and guidelines, including the procedures for cast iron, ductile iron, concrete, carbon steel, fiberglass, and thermoplastic pipe. Includes an introduction to horizontal directional drilling for pipe installation.

Circuitry Notes
• 152.5 Hours
• Revised: 2007, Third Edition
• Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK
Trainee Guide: $97

MODULES
All of the modules below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

Advanced Blueprint Reading (50 Hours)
Trainee $20
(Module ID 08401-07) Introduces drawings used by pipefitters in the shop and in the field. Explains how to read and interpret P&IDs, general arrangement drawings, ISOs, and shop sheets. Included are step-by-step instructions for following a line of pipe through a set of drawings. Includes nine 11" x 17" drawings.

Advanced Pipe Fabrication (50 Hours)
Trainee $20
(Module ID 08402-07) Discusses how to lay out and fabricate mitered bends, laterals, wyes, and ninety-degree intersections using tables of ordinates or a calculator. This knowledge is required in order to fabricate specialty bends and intersections.

Stress Relieving and Aligning (10 Hours)
Trainee $20
(Module ID 08403-07) Explains the nature of misalignment and methods of correcting it. Includes terminology that will help pipefitters communicate with millwrights who perform pump setup.

Steam Traps (10 Hours)
Trainee $20
(Module ID 08404-07) Discusses types of steam traps, how they function, and the basic methods for troubleshooting them.

In-Line Specialties (10 Hours)
Trainee $20
(Module ID 08405-07) Discusses specialty devices used in pipelines, including: bleed rings; ball and expansion joints; measuring devices for temperature, level, flow rate, and pressure; steam traps; drip legs; and desuperheaters. The purpose and function of each type is explained.

Special Piping (25 Hours)
Trainee $20
(Module ID 08406-07) Discusses methods of assembling copper and plastic pipe and tubing. Introduces brazing and soldering, and explains the differences between these two procedures. Also describes compression and flared fittings, and grooved and compression formed joining methods.
Pipefitting Level 4 (continued)

Hot Taps (10 Hours)

Maintaining Valves (10 Hours)
Trainee $20 ISBN 978-0-13-015305-0 (Module ID 24103) Discusses methods for preparing the trench for pipe installation, including stabilization, bedding, and initial backfill. Discusses effective methods for dewatering a trench and includes a section on troubleshooting dewatering equipment.

Introduction to Supervisory Roles (7.5 Hours)

MODULES

All of the modules below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

Job Site Safety (17.5 Hours)
Trainee $20 ISBN 978-0-13-015304-3 (Module ID 24101) Describes appropriate personal protective equipment commonly used on the job site and the impact of housekeeping on safety and project completion. Describes common indicators of existing utilities and recommends safe methods for locating and working around existing utilities.

Tools and Equipment (20 Hours)
Trainee $20 ISBN 978-0-13-015305-0 (Module ID 24102) Describes the safe use, care, and maintenance of pipefitter hand and power tools. Discusses methods for operating and maintaining dewatering equipment, generators, and compressors. Contains an introduction to drilling and tapping machines.

Testing Pipe (12.5 Hours)

Gaskets, Joints, and Fittings (20 Hours)
Trainee $20 ISBN 978-0-13-015307-4 (Module ID 24103) Discusses methods for receipt inspection, storage, and delivery to the trench of PVC, ductile iron, corrugated steel, and concrete pipe. Identifies the hand signals used by pipelayers when rigging pipe, and piping components, including manholes and appurtenances.

Cutting Pipe (12.5 Hours)

Dewatering (7.5 Hours)
Trainee $20 ISBN 978-0-13-015309-8 (Module ID 24105) Describes methods for preparing the trench for pipe installation, including stabilization, bedding, and initial backfill. Discusses effective methods for dewatering a trench and includes a section on troubleshooting dewatering equipment.

Foundation Stabilization, Bedding, and Dewatering (7.5 Hours)
Trainee $20 ISBN 978-0-13-015310-5 (Module ID 24106) Discusses the use, care, and maintenance of the optical level, transit, and the pipe laser. Contains a brief introduction to elevations as it relates to the setup of these instruments. Describes common causes and solutions to laser problems in the field.

Horizontal Directional Drilling Hazards
2.5 Hours
Module ID 75113-03
PAPERBACK Trainee Guide: $20
Contact your Pearson/NCCER executive director to order.
Introduces the hazards related to performing and working near horizontal directional drilling operations. Covers related on-site safety and emergency-response procedures.

Papercase Guide: $67
Plumbing

Introduction to Plumbing Drawings (17.5 Hours)
Trainee $20
(Module ID 02105-12) Introduces different types of plumbing drawings and discusses how to interpret and apply them when laying out and installing plumbing systems. Reviews the symbols used in plumbing and mechanical drawings, and reviews isometric, oblique, orthographic, and schematic drawings. Requires trainees to render plumbing drawings and to recognize how code requirements apply to plumbing drawings.

Plastic Pipe and Fittings (12.5 Hours)
Trainee $20
(Module ID 02106-12) Introduces different types of plastic pipe and fittings used in plumbing applications, including ABS, PVC, CPVC, PE, PEX, and PB. Describes how to measure, cut, join, and support pipe according to the manufacturer’s instructions and applicable codes. Discusses pressure testing of plastic pipe once installed.

Copper Tube and Fittings (12.5 Hours)
Trainee $20
(Module ID 02107-12) Discusses sizing, labeling, and applications of copper pipe and fittings, and reviews the types of valves that can be used on copper pipe systems. Explains proper methods for cutting, joining, and installing copper pipe. Addresses insulation, pressure testing, seismic codes, and handling and storage requirements.

Cast-Iron Pipe and Fittings (12.5 Hours)
Trainee $20
(Module ID 02108-12) Introduces hub-and-spigot and no-hub cast-iron pipe and fittings and their applications in DWV systems. Reviews material properties, storage and handling requirements, and fittings and valves. Covers joining methods, installation, and testing.

Carbon Steel Pipe and Fittings (12.5 Hours)
Trainee $20
(Module ID 02109-12) Discusses threading, labeling, and sizing of steel pipe and reviews the differences between domestic and imported pipe. Covers the proper techniques for measuring, cutting, threading, joining, and hanging steel pipe. Also reviews corrugated stainless steel tubing.

Introduction to Plumbing Fixtures (7.5 Hours)
Trainee $20
(Module ID 02110-12) Discusses the proper applications of code-approved fixtures in plumbing installations. Reviews the different types of fixtures and the materials used in them. Covers storage, handling, and code requirements.

Introduction to Drain, Waste, and Vent (DWV) Systems (10 Hours)
Trainee $20
(Module ID 02111-12) Explains how DWV systems remove waste safely and effectively. Discusses how system components, such as pipe, drains, traps, and vents work. Reviews drain and vent sizing, grade, and waste treatment. Discusses how building sewers and sewer drains connect the DWV system to the public sewer system.

Introduction to Water Distribution Systems (10 Hours)
Trainee $20
(Module ID 02112-12) Identifies the major components of water distribution systems and describes their functions. Reviews water sources and treatment methods, and covers supply and distribution for the different types of systems that trainees will install on the job.

Plumbing Math Two (15 Hours)
Trainee $20
(Module ID 02201-13) Explains the Pythagorean theorem and reviews methods for laying out square corners. Discusses the techniques used to calculate simple and rolling offsets, as well as offsets on parallel runs of pipe.

Reading Commercial Drawings (25 Hours)
Trainee $20
(Module ID 02202-13) Explains how to identify and interpret civil, architectural, structural, HVAC/mechanical, plumbing, and electrical drawings. Discusses how to ensure accurate dimensions, generate RTIs, and locate plumbing entry points, as well as how to establish piping routes and fixture locations. Isometric drawings, material takeoffs, approved submittal data, and Building Information Management (BIM), are also covered.

Structural Penetrations, Insulation, and Fire-Stopping (15 Hours)
Trainee $20
(Module ID 02203-13) Introduces methods for adjusting structural members, insulating pipe, and installing fire-stopping. Covers reinforcement techniques for modified structural members; how to measure, cut, and install fiberglass and flexible foam insulation; and how to identify walls, floors, and ceilings that require fire-stopping.

Installing and Testing DWV Piping (30 Hours)
Trainee $20
(ISBN 978-0-13-340278-0
(Module ID 02204-13) Explains how to locate, install, connect, and test a complete drain, waste, and vent (DWV) system. Discusses how to develop material takeoffs, set up and use levels, locate building sewers and building drains, locate fixtures, and test a DWV system.

Installing Roof, Floor, and Area Drains (5 Hours)
Trainee $20
(Module ID 02205-13) Covers the proper techniques for locating, installing, and connecting roof, floor, and area drains and floor sinks according to code. Discusses waterproof membranes and flashing, drain components, shower pans, trap primers, and proper drain applications.
L3 PLUMBING

Curriculum Notes

• 160 Hours
• Revised: 2014, Fourth Edition
• Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK ISBN
Trainee Guide: $97
978-0-13-340424-1
NCCERconnect Access Card: $97
978-0-13-422670-5
NCCERconnect + Trainee Guide: $122
978-0-13-427914-5

MODELS

All of the modules listed below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

Applied Math (17.5 Hours)
Trainee $20
(Module ID 02301-14) Reviews math concepts, including weights and measures, area and volume, temperature, pressure, and force. Describes the six simple machines: inclined planes, levers, pulleys, wedges, screws, and wheels and axles.

Sizing and Protecting the Water Supply System (30 Hours)
Trainee $20
(Module ID 02312-14) Teaches techniques for sizing water supply systems, including calculating system requirements and demand, developed lengths, and pressure drops. Reviews the factors that can reduce efficiency of water supply piping. Introduces different backflow prevention devices and explains how they work, where they are used, and how they are installed in water supply systems.

Potable Water Supply Treatment (15 Hours)
Trainee $20
(Module ID 02303-14) Explains how to disinfect, filter, and soften water supply systems. Discusses how to troubleshoot water supply problems, flush out visible contaminants from a plumbing system, and disinfect a potable water plumbing system.

Types of Vents (20 Hours)
Trainee $20
(Module ID 02305-14) Reviews the different types of vents that can be installed in a DWV system and explains how they work. Teaches design and installation techniques.

Sizing DWV and Storm Systems (20 Hours)
Trainee $20
(Module ID 02306-14) Explains how to calculate drainage fixture units for waste systems. Reviews how to size drain, waste, and vent (DWV) systems; storm drainage systems; and roof storage and drainage systems.

Sewage Pumps and Sump Pumps (12.5 Hours)
Trainee $20
(Module ID 02307-14) Discusses the installation, diagnosis, and repair of pumps, controls, and sumps in sewage and storm water removal systems.

Corrosive-Resistant Waste Piping (7.5 Hours)
Trainee $20
(Module ID 02308-14) Discusses corrosive wastes and reviews related safety issues and hazard communications. Explains how to determine when corrosive-resistant waste piping needs to be installed, as well as how to correctly select and properly connect different types of piping.

Compressed Air (10 Hours)
Trainee $20
(Module ID 02309-14) Explains the principles of compressed air systems and describes their components and accessories. Reviews installation and periodic servicing of air compressor systems.

Service Plumbing (27.5 Hours)
Trainee $20
ISBN 978-0-13-378279-0
(Module ID 02311-14) Covers the troubleshooting and repair of fixtures, valves, and faucets in accordance with code and safety guidelines. Describes how to diagnose and repair water supply and drainage piping, water heaters, and other appliances and fixtures. Describes the effects of corrosion, freezing, and hard water on plumbing systems.

LEVEL 4

L4 PLUMBING

Curriculum Notes

• 145 Hours
• Revised: 2014, Fourth Edition
• Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK ISBN
Trainee Guide: $97
978-0-13-382422-3
NCCERconnect Access Card: $97
978-0-13-422667-5
NCCERconnect + Trainee Guide: $122
978-0-13-427913-8

MODELS

All of the modules listed below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

Business Principles for Plumbers (15 Hours)
Trainee $20
(Module ID 02401-14) Introduces concepts and practices that are essential for competitive, successful plumbing businesses. Also covers basic business accounting and project estimating, as well as techniques for cost control and task organization.

Fundamentals of Crew Leadership (20 Hours)
Trainee $20
(Module ID 46101-11, Second Edition) Covers basic leadership skills and explains different leadership styles, communication, delegating, and problem solving. Jobsite safety and the crew leader’s role in safety are discussed, as well as project planning, scheduling, and estimating. Includes performance tasks to assist the learning process.

Water Pressure Booster and Recirculation Systems (12.5 Hours)
Trainee $20
(Module ID 02403-14) Builds on trainers’ previous experience with pumps, storage tanks, controls, and pipes and fittings by teaching how to assemble those components into systems that boost water pressure and provide hot water.

Indirect and Special Waste (17.5 Hours)
Trainee $20
(Module ID 02404-14) Describes the code requirements and installation procedures for systems that protect against contamination from indirect and special waste.

Hydronic and Solar Heating Systems (17.5 Hours)
Trainee $20
(Module ID 02405-14) Introduces the basic types of hydronic and solar heating systems and their components. Reviews hydronic and solar heating system layout, installation, testing, and balancing, and also discusses methods that inhibit corrosion in hydronic or solar heating systems.

Codes (12.5 Hours)
Trainee $20
(Module ID 02406-14) Discusses the different codes used by plumbers across the country and explains how those codes are written, adopted, modified, and implemented.
Plumbing Level 4 (continued)

Private Water Supply Well Systems (10 Hours)
Trainee $20
(Module ID 39102-05) Describes the installation of wells and water supply systems for private homes.

Private Waste-Disposal Systems (10 Hours)
Trainee $20
(Module ID 39104-05) Describes the installation of waste-disposal systems for private homes.

Swimming Pools and Hot Tubs (7.5 Hours)
Trainee $20
ISBN 978-0-13-378636-1
(Module ID 39103-05) Introduces trainees to the installation and maintenance of swimming pools and hot tubs.

Plumbing for Mobile Homes and Travel Trailer Parks (7.5 Hours)
Trainee $20
(Module ID 39101-05) Describes the installation of plumbing systems for mobile homes and travel trailer parks.

Introduction to Medical Gas and Vacuum Systems (15 Hours)
Trainee $20
(Module ID 27208-01) Covers the installation and maintenance of medical gas and vacuum systems for healthcare facilities.

Reinforcing Ironwork

Rigging Equipment (10 Hours)
Trainee $20
ISBN 978-0-13-228989-4
(Module ID 39103-05) Describes the use and inspection of basic equipment and hardware used in rigging, including slings, wire rope, chains, and attaching hardware such as shackles, eyebolts, and hooks, as well as rigging knots.

Rigging Practices (15 Hours)
Trainee $20
(Module ID 39104-05) Describes basic rigging and crane hazards and related safety procedures. Provides an overview of personnel lifting and lift planning, and introduces crane load charts and load balancing. Includes instructions for rigging and lifting pipe.

Commercial Blueprints (20 Hours)
Trainee $20
(Module ID 39105-05) Explains the format and content of drawings typically found in a commercial drawings package.

Oxyfuel Cutting (17.5 Hours)
Trainee $20
(Module ID 39106-05) Explains the safety requirements for oxyfuel cutting. Identifies equipment and setup requirements and explains how to light, adjust, and shut down oxyfuel equipment. Explains how to perform cutting techniques that include straight line, piercing, bevels, washing, and gouging.

Foundations and Flatwork (15 Hours)
Trainee $20
(Module ID 27204-01) Covers the construction of forms for foundations and flatwork. Describes the installation of concrete forms for various types of structures.

Concrete Forms (32.5 Hours)
Trainee $20
(Module ID 27205-01) Covers the applications and construction methods for various types of forms used in concrete construction, including wall, column, slab-and-beam, and stair forms.

Handling and Placing Concrete (22.5 Hours)
Trainee $20
(Module ID 27207-01) Covers the tools, equipment, and procedures required for handling, placing, and finishing concrete at the job site. Describes the use of joint sealants and form removal procedures. Safety procedures for handling, placing, and finishing concrete are emphasized.

Manufactured Forms (22.5 Hours)
Trainee $20
(Module ID 27208-01) Covers the types of manufactured forms and form hardware systems used in the construction of walls, columns, deck and roof slabs, beams and girders, culverts, and highways. Includes information on flying forms, slipforms, shoring, and architectural finishes.

Metal Decking (10 Hours)
Trainee $20
(Module ID 30116) Identifies the types of metal decking and how the advantages of metal decking over traditional wood and metal decking are utilized. Describes the advantages and disadvantages of various types of metal decking.

Introductory Skills for the Crew Leader (16 Hours)
Trainee $40
(Module ID MT101) Teaches leadership skills required to supervise personnel. Discusses principles of project planning, scheduling, estimating, and management. Presents several case studies for student participation.

L2 REINFORCING IRONWORK

Concrete Reinforcement (40 Hours)
Trainee $20
ISBN 978-0-13-228987-0
(Module ID 39101-05) Describes the selection and use of rebar, bar supports, and welded-wire fabric. Presents general procedures for cutting, bending, splicing, and tying rebar, and placement of steel in various types of footings, columns, walls, and slabs.

Concrete Reinforcement Safety (15 Hours)
Trainee $20
(Module ID 39102-05) Focuses on safety topics of particular concern to the reinforcing ironworker, including rebar-related hazards, fall protection, use of positioning devices, PPE, excavations, and lifting/carrying techniques.

L1 REINFORCING IRONWORK

Private Water Supply Well Systems (10 Hours)
Trainee $20
(Module ID 02408-14) Describes the operation of pumps and well components. Reviews the qualities of good wells and how to assemble and disassemble pumps and components.

Private Waste-Disposal Systems (10 Hours)
Trainee $20
(Module ID 02409-14) Describes the types of private waste-disposal systems, discusses the maintenance and installation of these systems, and explains how to determine the local code requirements for these systems. Covers percolation tests and sewage system planning and layout.

To Order Call: 1-800-922-0579
Stay Connected: www.nccer.org/instructors
**Scaffolding**

- **152.5 Hours (Includes 72.5 hours of Core Curriculum, which is a prerequisite for Level 1 completion and must be purchased separately. See p. 14 for ordering information.)**
- **Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.**
- **A Spanish translation is available. Please see NCCER’s online catalog for more information.**

**Supported Scaffolds (32.5 Hours)**  
Trainee $20  
(Module ID 31105-15) Identifies the equipment used with supported scaffolds. Describes the procedures for erecting supported scaffolds.

**Mobile Scaffolds (10 Hours)**  
Trainee $20  
(Module ID 31106-15) Identifies the different types of powered and manually propelled mobile scaffolds and describes their erection and operation.

**Suspension Scaffolds (7.5 Hours)**  
Trainee $20  
(Module ID 31107-15) Identifies the types of equipment used with suspension scaffolds. Describes the rigging of suspension scaffolds.

**Sheet Metal**

- **175 Hours (Includes 72.5 hours of Core Curriculum, which is a prerequisite for Level 1 completion and must be purchased separately. See p. 14 for ordering information.)**
- **NATE-Recognized Training Provider**
- **Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.**
- **A Spanish translation is available. Please see NCCER’s online catalog for more information.**

**NATE CERTIFICATION**  
NCCER is an officially recognized training provider for North American Technician Excellence (NATE), an independent, third-party certification body for HVAC/R technicians. NATE-certified technicians can use module completions through NCCER-accredited training providers for the continuing education hours required for recertification through NATE. For details and lists of available NATE-recognized training, visit www.natex.org. For more information regarding NATE recertification, please contact NCCER Customer Service at 1-888-622-3720.

**Tools of the Trade (5 Hours)**  
Trainee $20  
(Module ID 04102-08) Describes the hand and power tools used in the sheet metal trade, including layout tools and cutting, bending, and forming machines. Includes safety and maintenance guidelines.

**Fabrication One — Parallel Line Development (22.5 Hours)**  
Trainee $20  
(Module ID 04106-08) Addresses ductwork assembly, use of different types of sealants, using lifts, and installation of ductwork. Describes the types of fasteners (screws, nuts, bolts, and rivets), and supports used in an air distribution system. Discusses proper spacing of hangers, load ratings, and installation of hangers and support systems.

**Installation of Ductwork (15 Hours)**  
Trainee $20  
(Module ID 04105-08) Covers the steps involved in using the parallel line development method to lay out fittings. Includes step-by-step procedures for selected fittings.

**Installation of Air Distribution Accessories (5 Hours)**  
Trainee $20  
(Module ID 04107-08) Describes how air distribution accessories such as louvers, dampers, and access doors function as part of an air distribution system. Includes installation guidelines and checklists.

**Introduction to Sheet Metal Layout and Processes (7.5 Hours)**  
Trainee $20  
(Module ID 04103-08) Introduces parallel line development, radial line development, and triangulation. Covers the selection and use of layout, hand, and machine tools. Discusses how to transfer patterns, and how to cut, form, and assemble parts.

**Introduction to the Trade (7.5 Hours)**  
Trainee $20  
(Module ID 31101-15) Introduces the scaffolding program, describes the duties of a scaffolder, and identifies scaffold types and scaffolding terms.

**Trade Safety (7.5 Hours)**  
Trainee $20  
(Module ID 31102-15) Provides a comprehensive overview of the safety regulations and guidelines in the scaffolding industry.

**Trade Tools and Equipment (7.5 Hours)**  
Trainee $20  
(Module ID 31103-15) Covers the safe use and applications of hand and power tools used in the trade.

**Trade Math One (20 Hours)**  
Trainee $20  
(Module ID 04104-08) Builds on trainees’ basic math skills to solve trade-related problems. Covers calculations using denominates, area and volume calculations, English-metric system conversions, basic geometry, and calculation of stretchouts.

**Trade Math One – Parallel Line Development (22.5 Hours)**  
Trainee $20  
(Module ID 04106-08) Addresses ductwork assembly, use of different types of sealants, using lifts, and installation of ductwork. Describes the types of fasteners (screws, nuts, bolts, and rivets), and supports used in an air distribution system. Discusses proper spacing of hangers, load ratings, and installation of hangers and support systems.

**Installation of Ductwork (15 Hours)**  
Trainee $20  
(Module ID 04105-08) Covers the steps involved in using the parallel line development method to lay out fittings. Includes step-by-step procedures for selected fittings.

**Installation of Air Distribution Accessories (5 Hours)**  
Trainee $20  
(Module ID 04107-08) Describes how air distribution accessories such as louvers, dampers, and access doors function as part of an air distribution system. Includes installation guidelines and checklists.

**Introduction to Sheet Metal Layout and Processes (7.5 Hours)**  
Trainee $20  
(Module ID 04103-08) Introduces parallel line development, radial line development, and triangulation. Covers the selection and use of layout, hand, and machine tools. Discusses how to transfer patterns, and how to cut, form, and assemble parts.

**Introduction to the Trade (7.5 Hours)**  
Trainee $20  
(Module ID 31101-15) Introduces the scaffolding program, describes the duties of a scaffolder, and identifies scaffold types and scaffolding terms.

**Trade Safety (7.5 Hours)**  
Trainee $20  
(Module ID 31102-15) Provides a comprehensive overview of the safety regulations and guidelines in the scaffolding industry.

**Trade Tools and Equipment (7.5 Hours)**  
Trainee $20  
(Module ID 31103-15) Covers the safe use and applications of hand and power tools used in the trade.

**Trade Math One (20 Hours)**  
Trainee $20  
(Module ID 04104-08) Builds on trainees’ basic math skills to solve trade-related problems. Covers calculations using denominates, area and volume calculations, English-metric system conversions, basic geometry, and calculation of stretchouts.

**Tools of the Trade (5 Hours)**  
Trainee $20  
(Module ID 04102-08) Describes the hand and power tools used in the sheet metal trade, including layout tools and cutting, bending, and forming machines. Includes safety and maintenance guidelines.

**Fabrication One — Parallel Line Development (22.5 Hours)**  
Trainee $20  
(Module ID 04106-08) Addresses ductwork assembly, use of different types of sealants, using lifts, and installation of ductwork. Describes the types of fasteners (screws, nuts, bolts, and rivets), and supports used in an air distribution system. Discusses proper spacing of hangers, load ratings, and installation of hangers and support systems.

**Installation of Ductwork (15 Hours)**  
Trainee $20  
(Module ID 04105-08) Covers the steps involved in using the parallel line development method to lay out fittings. Includes step-by-step procedures for selected fittings.

**Installation of Air Distribution Accessories (5 Hours)**  
Trainee $20  
(Module ID 04107-08) Describes how air distribution accessories such as louvers, dampers, and access doors function as part of an air distribution system. Includes installation guidelines and checklists.

**Introduction to Sheet Metal Layout and Processes (7.5 Hours)**  
Trainee $20  
(Module ID 04103-08) Introduces parallel line development, radial line development, and triangulation. Covers the selection and use of layout, hand, and machine tools. Discusses how to transfer patterns, and how to cut, form, and assemble parts.

**Introduction to the Trade (7.5 Hours)**  
Trainee $20  
(Module ID 31101-15) Introduces the scaffolding program, describes the duties of a scaffolder, and identifies scaffold types and scaffolding terms.

**Trade Safety (7.5 Hours)**  
Trainee $20  
(Module ID 31102-15) Provides a comprehensive overview of the safety regulations and guidelines in the scaffolding industry.

**Trade Tools and Equipment (7.5 Hours)**  
Trainee $20  
(Module ID 31103-15) Covers the safe use and applications of hand and power tools used in the trade.

**Trade Math One (20 Hours)**  
Trainee $20  
(Module ID 04104-08) Builds on trainees’ basic math skills to solve trade-related problems. Covers calculations using denominates, area and volume calculations, English-metric system conversions, basic geometry, and calculation of stretchouts.
Sheet Metal Level 1 (continued)

**Insulation** (7.5 Hours)
(Module ID 04108-08) Describes how to install fiberglass blanket, foam, and pipe insulation using approved adhesives and fastening techniques. Also includes the fabrication and installation of fitting covers and preformed fitting covers.

**Architectural Sheet Metal** (15 Hours)
(Module ID 04109-08) Teaches how to lay out and fabricate sheet metal components of a roof drainage system, including flashing, gutters, and downspouts.

---

**L2 SHEET METAL**

**Curriculum Notes**
- 165 Hours
- NATE-Recognized Training Provider
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

**PAPERBACK**
Trainee Guide: $97

** MODULES**
All of the modules below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

**Trade Math Two** (20 Hours)
(Module ID 04201-08) Demonstrates how to apply formulas to solve a variety of mathematical problems. Covers linear, area, volume, and angle measurement and percentage, ratio, and proportion. Provides practical instruction in using protractors, vernier calipers, and micrometers and in solving field measuring problems.

**Plans and Specifications** (20 Hours)
(Module ID 04202-08) Reviews how to read and interpret section, elevation, and detail drawings. Also covers other specifications and other sources of project information. Includes 17 construction drawings.

**Fabrication Two – Radial Line Development** (35 Hours)
(Module ID 04203-08) Introduces radial line development principles used to determine layouts for sheet metal fittings. Includes practice layout and fabrication tasks that allow trainees to develop and practice their skills.

**Sheet Metal Duct Fabrication Standards** (7.5 Hours)
(Module ID 04204-08) Explains how to determine the requirements for a duct system, including operating pressures, metal gauges, connectors, reinforcements, tie rods, and seams. Also reviews how to use standards, codes, and ordinances to design a duct system.

**Air Properties and Distribution** (15 Hours)
(Module ID 04205-08) Explains the properties of air and how these properties relate to one another. Teaches how to use the gas laws, psychrometric charts, and measuring instruments to evaluate air properties in an air distribution system.

**Bend Allowances** (5 Hours)
(Module ID 04206-08) Provides instruction and practice in determining proper bend allowances in sheet metal. Also reviews the interplay of different factors that affect the amount of bend allowance needed and the methods for calculating allowance.

**Soldering** (15 Hours)
(Module ID 04207-08) Identifies soldering tools, materials, and techniques. Also provides a wide range of soldering tasks for practice.

**Basic Piping Practices** (7.5 Hours)
Trainee $20 ISBN 978-0-13-609939-0
(Module ID 04208-08) Reviews the methods for measuring, cutting, and joining selected types of pipe using fittings, hangers, and supports. Also reviews pipe materials and applications.

**Fiberglass Duct** (20 Hours)
(Module ID 04209-08) Describes fiberglass duct layout and fabrication methods. Also discusses closure, hanging, and support methods. Explains how to repair major and minor damage to fiberglass duct.

---

**L3 SHEET METAL**

**Curriculum Notes**
- 157.5 Hours
- Revised: 2009, Third Edition
- NATE-Recognized Training Provider
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

**PAPERBACK**
Trainee Guide: $97

** MODULES**
All of the modules below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

**Trade Math Three – Field Measuring and Fitting** (15 Hours)
(Module ID 04301-09) Describes the principles of triangulation and how it can be used to measure duct run fittings. Provides a variety of tasks to practice developing, laying out, and fabricating selected duct run fittings.

**Fiberglass Duct** (20 Hours)
(Module ID 04209-08) Describes fiberglass duct layout and fabrication methods. Also discusses closure, hanging, and support methods. Explains how to repair major and minor damage to fiberglass duct.

**Fiberglass Duct** (20 Hours)
(Module ID 04209-08) Describes fiberglass duct layout and fabrication methods. Also discusses closure, hanging, and support methods. Explains how to repair major and minor damage to fiberglass duct.

**Soldering** (15 Hours)
(Module ID 04207-08) Identifies soldering tools, materials, and techniques. Also provides a wide range of soldering tasks for practice.

**Basic Piping Practices** (7.5 Hours)
Trainee $20 ISBN 978-0-13-609939-0
(Module ID 04208-08) Reviews the methods for measuring, cutting, and joining selected types of pipe using fittings, hangers, and supports. Also reviews pipe materials and applications.

**Fiberglass Duct** (20 Hours)
(Module ID 04209-08) Describes fiberglass duct layout and fabrication methods. Also discusses closure, hanging, and support methods. Explains how to repair major and minor damage to fiberglass duct.

---

**Principles of Airflow** (22.5 Hours)
(Module ID 04303-09) Explains the basic principles of airflow and reviews how airflow is affected by duct size, shape, and fittings. Also reviews the components of an air distribution system.

**Louvered, Dampers, and Access Doors** (20 Hours)
(Module ID 04304-09) Discusses the different types of louvers, dampers, and access doors used in air distribution systems and reviews the standards that apply to them.

**Comprehensive Plan and Specification Reading** (30 Hours)
(Module ID 04305-09) Provides a case-study approach to learning how to use building plans and specifications to lay out, fabricate, and install HVAC systems. Allows trainees to proceed through the module as if they were working on an actual building project. Includes construction drawings.

**Fabrication Three – Triangulation** (47.5 Hours)
(Module ID 04306-09) Describes the principles of triangulation and how it can be used to measure duct run fittings. Provides a variety of tasks to practice developing, laying out, and fabricating selected duct run fittings.

**Advanced Architectural Sheet Metal** (12.5 Hours)
(Module ID 04307-09) Provides trainees with the opportunity to practice layout, fabrication, and installation of various architectural pieces.

---

**L4 SHEET METAL**

**Curriculum Notes**
- 150 Hours
- Revised: 2009, Third Edition
- NATE-Recognized Training Provider
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

**PAPERBACK**
Trainee Guide: $97

** MODULES**
All of the modules below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

**Trade Math Three – Field Measuring and Fitting** (15 Hours)
(Module ID 04401-09) Describes the principles of triangulation and how it can be used to measure duct run fittings. Provides a variety of tasks to practice developing, laying out, and fabricating selected duct run fittings.

**Shop Production and Organization** (15 Hours)
(Module ID 04401-09) Produces the introduction, organization, planning, and control functions that occur in a sheet metal shop. Emphasizes optimization of processes and accurate estimating for competitive bidding. Discusses project planning techniques, principles of efficient shop layout and materials flow, the critical path method, and the roles and relationships of shop personnel.
Sheet Metal Level 4 (continued)

Air Testing and Balancing (25 Hours)
(Module ID 04402-09) Explains how to balance an air distribution system so that the right amount of air is correctly distributed at the proper velocities and returned to the heating and cooling units. Reviews the tools and techniques used for adjusting fans, volume dampers, registers, and grilles. Provides proper techniques for duct leakage testing.

Introduction to Welding, Brazing and Cutting (25 Hours)
(Module ID 04403-09) Introduces the techniques and proper operation of equipment used for welding, brazing, and cutting. Emphasizes safety and awareness of hazards involved. Trainees practice welds in a variety of positions and perform a basic braze.

Fume and Exhaust System Design (25 Hours)
(Module ID 04404-09) Reviews the codes and specifications pertaining to fume and exhaust system design for safe workplaces. Provides instruction in selecting the appropriate materials for fume or exhaust system components and to identify the different types of hoods and applications for each.

Fabrication Four – Comprehensive Review (40 Hours)
(Module ID 04405-09) Provides a review of parallel line, radial line, and triangulation development methods for laying out sheet metal patterns. Trainees practice laying out and fabricating selected sheet metal fittings using these methods.

Introductory Supervisory Skills (20 Hours)
(Module ID 04406-09) Teaches skills required to supervise personnel, including leadership, team building, communication and motivation. Discusses gender and cultural issues. Emphasizes principles of project planning and management, including problem solving and decision making. Presents case studies for student participation.

Survey Equipment Use and Care One (30 Hours)
(Module ID 78103-04) Covers the use and care of tools and instruments commonly used to perform site survey work. Introduces the instruments and procedures used for making distance measurements electronically and for performing differential leveling and basic horizontal and vertical angular measurements. Includes guidelines for recording surveying measurement data in field notes.

Blueprint Reading for Surveyors (20 Hours)
(Module ID 78104-04) Expands on the Core Curriculum module, Introduction to Construction Drawings, and provides techniques for reading and using drawings and specifications. Emphasis is placed on drawings and types of information that are relevant to the site layout trade.

Survey Equipment Use and Care Two, EDMs and Total Stations (10 Hours)
(Module ID 78202-04) Covers the setup, use, calibration, and care of electronic distance measuring instruments and total stations.

Control Setup (30 Hours)
(Module ID 78203-04) Contains information and instructions for setting up, running, recording, and closing a horizontal traverse and a level loop. Also covers primary and secondary control plans, as well as vertical control for multilevel structures.

Boundary and Topography Surveys (10 Hours)
(Module ID 78204-04) Contains information and instructions for gathering, recording, and plotting profile and cross-section leveling data. Includes plot and site plans to identify rights-of-way, utilities, setbacks, boundaries, and tie-in locations.

Data Collection and Basic Computer Skills (10 Hours)
(Module ID 78205-04) Covers the use of integrated total station systems and GPS surveying systems. Explains the use of integrated field and office software to collect and manage data.

Concrete Properties and Quality Control (15 Hours)
(Module ID 78206-04) Covers the chemical and physical properties of concrete and the components, such as cement, aggregates, and admixtures, that make up the concrete mixture. Explains the various methods and equipment used to sample, test, and inspect concrete.

Means and Methods (40 Hours)
Trainee $20 ISBN 978-0-13-160027-0
(Module ID 78207-04) Provides extensive coverage of soils and their classifications and explains how various soils behave in excavations. Covers the safety procedures and equipment used when working in or near trenches. Provides layout procedures for footings, piers, building corners, columns, walls, embankments, and stairs.

To Order Call: 1-800-922-0579 www.nccer.org/instructors

Stay Connected:
Facebook Twitter

Sheet Metal Level 4 (continued)
## L1 SPRINKLER FITTING

**Module: Copper Tube Systems (10 Hours)**
- **Trainee:** $20
- **Module ID:** 18103-13
- Introduces copper tubing and fittings along with cutting and bending tools. Describes the soldering process and techniques for measuring, cutting, reaming, and cleaning. Brazing is described as are brazing metals, fluxes, and brazing equipment. Supports brassing for copper tube and grooved couplings for copper pipe are also discussed.

**Module: Underground Pipe (17.5 Hours)**
- **Trainee:** $20
- **Module ID:** 18104-13
- Details underground piping installations for various types of pipe. Explains thrust blocks and restraints. In-building risers, hydrants, yard valves, and hydrant houses are discussed as are testing, inspection, flushing, and chlorinating. The underground test certificate is also covered.

## L2 SPRINKLER FITTING

**Module: Steel Pipe (22.5 Hours)**
- **Trainee:** $20
- **Module ID:** 18102-13
- Identifies steel piping materials along with tools used to cut and thread steel pipe. Describes methods for threading, cutting, and grooving pipe, including how to determine pipe length between fittings (takeouts). Discusses threaded, plain-end, and flanged fittings.

**Module: CPVC Pipe and Fittings (10 Hours)**
- **Trainee:** $20
- **Module ID:** 18104-13
- Describes handling and storage of CPVC pipe. Identifies CPVC safety concerns and cautions. Outlines methods and tools for cutting, chamfering, and cleaning CPVC pipe, including calculating takeouts. Joining techniques are described, particularly the solvent-cement (one-step) method. Rules for using plastic pipe hangers are explained.

## L3 SPRINKLER FITTING

**Module: General Purpose Valves (15 Hours)**
- **Trainee:** $20
- **Module ID:** 18202-13
- Covers types of valves and valve applications, including service procedures for standard valves. Also covers installation of OS&Y valves, butterfly grooved valves, and tamper switches. Outlines procedures for disassembling, servicing, and reassembling check valves.

**Module: Deluge/Preaction Systems (20 Hours)**
- **Trainee:** $20
- **Module ID:** 18302-13
- Describes standpipe classifications and explains flow capabilities of each type. Covers requirements for sizing and installation of standpipes. Discusses pressure-reducing valves under flow and no-flow conditions. Also covers LINK-SEAL® installations.

**Module: Water Supplies (15 Hours)**
- **Trainee:** $20
- ISBN: 978-0-13-378873-0
- **Module ID:** 18303-13
- Covers basic water chemistry and properties. Discusses methods of determining water supply requirements and considerations for supply systems. Discusses infrastructure, measurement of water supply capability, water supply appurtenances, fire department connections, and typical city water pits.
Sprinkler Fitting Level 3 (continued)

Fire Pumps (40 Hours)
Trainee $20
(Module ID 18304-13) Covers fire pump categories and components. Describes fire pump controller requirements and fire pump performance and alignment. Explains pump and driver characteristics and performance curves as well as controllers, sensing lines, supervision, and starting methods. Outlines project requirements, installation, maintenance, and troubleshooting.

Application-Specific Sprinklers and Nozzles (27.5 Hours)
Trainee $20
(Module ID 18305-13) Describes application-specific sprinkler types and requirements. Discusses area of coverage, positioning, and obstruction requirements and explains system selection.

MODULES
All of the modules below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

System Layout (45 Hours)
Trainee $20
(Module ID 18401-13) Identifies basic hydraulic concepts and selection of hydraulic design methods. System configuration, design criteria, discharge characteristics, and types of pressure loss are explained. Explains how to perform fire sprinkler system hydraulic calculations.

Inspection, Testing, and Maintenance (17.5 Hours)
Trainee $20
(Module ID 18402-13) Describes initial and periodic testing and inspection requirements, as well as maintenance and repair of wet-pipe systems, dry-pipe systems, preaction/deluge systems, and special systems.

Special Extinguishing Systems (42.5 Hours)
Trainee $20
(Module ID 18403-13) Identifies the following extinguishing systems: water spray, foam, carbon dioxide, Halon, auxiliary and local alarm. Limited water systems, fire extinguishers, and water mist suppression systems are also covered.

Introductory Skills for the Foreman (20 Hours)
Trainee $20
(Module ID 18404-13) Introduces the role of foremanship and covers responsibilities, leadership, and safety. Also explains project documentation and reports related to materials tracking and labor tracking.

Procedures and Documentation (20 Hours)
Trainee $20
(Module ID 18405-13) Explains the importance of proper documentation to ensure correct installation and avoid future rework and possible unintentional releases. Emphasizes the need to properly document the actual installation using written reports and photographs. Includes causes of and responses to water damage, and provides a case history of an unintentional release.

L1 WELDING
LEVEL 1

Curriculum Notes
• 357.5 Hours (Includes 72.5 hours of Core Curriculum, which is a prerequisite for Level 1 completion and must be purchased separately. See p. 14 for ordering information.)
• Revised: 2015, Fifth Edition
• Sequenced in accordance with the American Welding Society’s (AWS) S.E.N.S.E school requirements. When combined with NCCER Welding Level 2, the content aligns with the key indicators specified in AWS E02.0:2008 Level 1-Entry Welder.
• Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

HARDCOVER
Trainee Guide: $69

PAPERBACK
Trainee Guide: $67

NCCERconnect Access Card: $67
NCCERconnect + Hardcover Trainee Guide: $94
NCCERconnect + Paperback Trainee Guide: $92

MODULES
All of the modules listed below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

Welding Safety (5 Hours)
Trainee $20
(Module ID 29101-15) Covers safety equipment, protective clothing, and procedures applicable to the cutting and welding of metals.

Oxyfuel Cutting (17.5 Hours)
Trainee $20
(Module ID 29102-15) Explains the safety requirements for oxyfuel cutting. Identifies oxyfuel cutting equipment and setup requirements. Explains how to light, adjust, and shut down oxyfuel equipment. Trainees will perform cutting techniques that include straight line, piercing, bevels, washing, and gouging.

Plasma Arc Cutting (7.5 Hours)
Trainee $20
(Module ID 29103-15) Introduces plasma arc cutting equipment and safe work area preparation. Identifies correct amperage, gas pressures, and flow rates. Covers plasma-arc cutting methods for piercing, slotting, squaring, and beveling metals. Explains how to store equipment and clean the work area.

ALIGNS WITH AWS SENSE STANDARDS AND GUIDELINES
NCCER is pleased to support the American Welding Society’s Schools Excelling through National Skills Education (SENSE) Entry Welder program with Levels 1 and 2 of its Welding curriculum. This curriculum supports the key learning indicators and performance accreditation tasks required to complete the current SENSE program.

Welding

To Order Call: 1-800-922-0579
Stay Connected: www.nccer.org/instructors 57
Welding Level 1 (continued)

Air-Carbon Arc Cutting and Gouging (10 Hours)
Trainee $20

**Module ID 29104-15** Introduces air-carbon arc cutting equipment and processes. Identifies the electrodes and safe operation of the equipment. Provides step-by-step instructions for performing air-carbon arc washing and gouging activities.

Base Metal Preparation (12.5 Hours)
Trainee $20

**Module ID 29105-15** Describes how to clean and prepare all types of base metals for cutting or welding. Identifies and explains joint design and base metal preparation for all welding tasks.

Weld Quality (10 Hours)
Trainee $20

**Module ID 29106-15** Identifies the codes that govern welding, including marine welds. Identifies and explains weld imperfections and causes. Describes non-destructive testing, visual inspection criteria, welder qualification tests, and the importance of quality workmanship.

SMAW – Equipment and Setup (5 Hours)
Trainee $20

**Module ID 29107-15** Describes SMAW welding and welding safety. Explains how to connect welding current and set up arc welding equipment. Also explains how to use tools for cleaning welds.

SMAW Electrodes (2.5 Hours)
Trainee $20

**Module ID 29108-15** Describes electrode characteristics and different types of filler metals. Reviews the role of the American Welding Society (AWS) and the American Society of Mechanical Engineers (ASME). Explains proper storage and control of filler metals and identifies the use of codes.

SMAW – Beads and Fillet Welds (100 Hours)
Trainee $20

**Module ID 29109-15** Describes the preparation and setup of arc welding equipment and the process of striking an arc. Explains how to detect and correct arc blow. Describes how to make stringer, weave, overlapping beads, and fillet welds.

Joint Fit-Up and Alignment (5 Hours)
Trainee $20

**Module ID 29110-15** Describes job code specifications. Explains how to use fit-up gauges and measuring devices to check fit-up and alignment and use plate and pipe fit-up and alignment tools to properly prepare joints. Explains how to check for joint misalignment and poor fit.

SMAW – Groove Welds with Backing (50 Hours)
Trainee $20

**Module ID 29111-15** Introduces groove welds and explains how to set up welding equipment for making groove welds. Describes how to make groove welds with backing. Provides procedures for making flat, horizontal, vertical, and overhead groove welds.

SMAW – Open-Root Groove Welds – Plate (60 Hours)
Trainee $20

**Module ID 29112-15** Introduces various types of groove welds and describes how to prepare for groove welding. Describes the techniques required to produce various open V-groove welds.

L2 WELDING

Curriculum Notes

- 227.5 Hours
- Revised: 2015, Fifth Edition
- Sequenced in accordance with the American Welding Society’s (AWS) S.E.N.S.E school requirements. When combined with NCCER Welding Level 1, the content aligns with the key indicators specified in AWS EG2.0.2008 Level 1-Entry Welder.
- Downloadable instructor resources that include module tests, PowerPoint®, and performance profile sheets are available at www.nccer.org/irc.

**Module Note:** All of the modules listed below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

**Welding Symbols** (5 Hours)
Trainee $20

**Module ID 29201-15** Identifies and explains the different types of filler weld, groove weld, and non-destructive examination symbols. Explains how to read welding symbols on drawings, specifications, and Welding Procedure Specifications (WPS).

**Reading Welding Detail Drawings** (10 Hours)
Trainee $20

**Module ID 29202-15** Identifies and explains welding detail drawings. Describes lines, fills, object views, and dimensioning on drawings. Explains how to use notes on drawings and the bill of materials. Explains how to sketch and draw basic welding drawings.

**Physical Characteristics and Mechanical Properties of Metals** (7.5 Hours)
Trainee $20

**Module ID 29203-15** Explains physical characteristics, mechanical properties, composition, and classification of common ferrous and nonferrous metals. Identifies the various standard metal forms and structural shapes. Shows how to extract metal information from Welding Procedure Specification (WPS) sheets and Procedure Qualification Records (PQRs). Covers visual inspection, magnetic testing, and X-ray fluorescent spectrometry methods used to identify metals.

**Preheating and Postheating of Metals** (5 Hours)
Trainee $20

**Module ID 29204-15** Explains preheating, interpass temperature control, and postheating procedures that sometimes need to be done to preserve weldment strength, ductility, and weld quality. Covers the equipment used for heat treating metals.

L3 WELDING

Curriculum Notes

- 470 Hours (370 Required; 100 Elective/Optional)
- Revised: 2016, Fifth Edition
- Downloadable instructor resources that include module tests, PowerPoint®, and performance profile sheets are available at www.nccer.org/irc.

**Module Note:** All of the modules listed below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

**SMAW – Open-Root Pipe Welds** (100 Hours)
Trainee $20

**Module ID 29301-16** Explains how to set up SMAW equipment for open-root V-groove welds, and explains how to prepare for and make open-root V-groove welds on carbon steel pipe. Provides procedures for making open-root V-groove welds with SMAW equipment on pipe in the 1G-ROTATED, 2G, 5G, and 6G positions.

**GMAW and FCAW – Equipment and Filler Metals** (10 Hours)
Trainee $20

**Module ID 29205-15** Describes general safety procedures for GMAW and FCAW. Identifies GMAW and FCAW equipment and explains the filler metals and shielding gases used to perform GMAW and FCAW. Explains how to set up and use GMAW and FCAW equipment and how to clean GMAW and FCAW welds.

**GMAW – Plate** (60 Hours)
Trainee $20

**Module ID 29209-15** Explains how to set up and use GMAW equipment and how to select and use different filler metals and shielding gases. Describes how to make multiple-pass fillet and V-groove welds on carbon steel plate in various positions.

**FCAW – Plate** (60 Hours)
Trainee $20

**Module ID 29210-15** Explains how to set up and use FCAW equipment and how to select and use different filler metals and shielding gases. Describes how to make multiple-pass fillet and V-groove welds on carbon steel plate in various positions.

**GTAW – Equipment and Filler Metals** (10 Hours)
Trainee $20

**Module ID 29207-15** Explains GTAW safety. Identifies and explains the use of GTAW equipment, filler metals, and shielding gases. Covers the setup of GTAW equipment.

**GTAW – Plate** (60 Hours)
Trainee $20

**Module ID 29208-15** Describes how to build pads on carbon steel plate using GTAW and carbon steel filler metal. Also explains how to make multiple-pass GTAW fillet welds on carbon steel plate coupons in the 1F, 2F, 3F, and 4F positions, and how to make GTAW V-groove welds in the 1G, 2G, 5G, and 4G positions.
Welding Level 3 (continued)

**GMAW – Pipe (60 Hours)**
Trainee $20  
(Module ID 29302-16) Explains how to set up GMAW equipment for open-root V-groove welds, and explains how to prepare for and make open-root V-groove welds on carbon steel pipe. Provides procedures for making open-root V-groove welds with GMAW equipment on pipe in the 1G-ROTATED, 2G, 5G, and 6G positions.

**GTAW – Low Alloy and Stainless Steel Pipe**
Trainee $20  
(Module ID 29303-16) Explains how to set up GTAW equipment for open-root V-groove welds, and explains how to prepare for and make open-root V-groove welds on carbon steel pipe. Provides procedures for making open-root V-groove welds with GTAW equipment on pipe in the 1G-ROTATED, 2G, 5G, and 6G positions.

**GTAW – Aluminum Pipe**
Trainee $20  
(Module ID 29305-16) Explains how to set up GTAW equipment for open-root V-groove welds on low-alloy and stainless steel pipe, and explains how to prepare for and make open-root V-groove welds on low-alloy and stainless steel pipe. Provides procedures for making open-root V-groove welds with GTAW equipment on low-alloy and stainless steel pipe in the 2G, 5G, and 6G positions.

**SMAW – Aluminum Plate and Pipe Groove Welds (100 Elective Hours)**
Trainee $20  
(Module ID 29306-16) Explains stainless steel metallurgy; how to select SMAW electrodes for stainless steel welds; and how to weld different types of stainless steels. Covers safety issues associated with welding on stainless steels; how to prepare weld coupons; and how to set up SMAW equipment for welding stainless steel. Provides procedures for making open-root V-groove welds with SMAW equipment on stainless steel plate in the 1G, 2G, 3G, and 4G positions. Includes procedures for making open-root V-groove welds with SMAW equipment on stainless steel pipe in the 1G-ROTATED, 2G, 5G, and 6G positions.

**GTAW – Aluminum Pipe (30 Hours)**
Trainee $20  
(Module ID 29402-16) Covers the setup of GTAW equipment for welding aluminum pipe. Explains how to clean and prepare aluminum plate coupons for welding, and how to select the aluminum filler metals and shielding gases used in the GTAW process. Explains GTAW techniques used in aluminum welding. Provides GTAW procedures on how to build weld pads on aluminum plate; how to make fillet welds on aluminum plate in the 1F, 2F, 3F, and 4F positions; and how to make V-groove welds on aluminum plate with backing in the 1G, 2G, 3G, and 4G positions.

**GTAW – Carbon Steel Pipe (80 Hours)**
Trainee $20  
(Module ID 29304-16) Explains how to set up GTAW equipment for open-root V-groove welds, and explains how to prepare for and make open-root V-groove welds on carbon steel pipe. Provides procedures for making open-root V-groove welds with GTAW equipment on pipe in the 2G, 5G, and 6G positions.

**GTAW – Stainless Steel Pipe (100 Hours)**
Trainee $20  
ISBN 978-0-13-448572-0  
(Module ID 29303-16) Explains how to set up GTAW equipment for open-root V-groove welds, and explains how to prepare for and make open-root V-groove welds on stainless steel pipe. Provides procedures for making open-root V-groove welds with GTAW equipment on stainless steel pipe in the 2G, 5G, and 6G positions.

**GTAW – Stainless Steel Plate and Pipe**
Trainee $20  
(Module ID 29301-16) Explains how to set up GTAW equipment for open-root V-groove welds, and explains how to prepare for and make open-root V-groove welds on stainless steel plate. Provides procedures for making open-root V-groove welds with GTAW equipment on stainless steel plate in the 1G-ROTATED, 2G, 5G, and 6G positions.

**GTAW – Stainless Steel Plate**
Trainee $20  
ISBN 978-0-13-448574-4  
(Module ID 29304-16) Explains how to set up GTAW equipment for open-root V-groove welds, and explains how to prepare for and make open-root V-groove welds on stainless steel plate. Provides procedures for making open-root V-groove welds with GTAW equipment on stainless steel plate in the 1G-ROTATED, 2G, 5G, and 6G positions.

**GTAW – Aluminum Plate**
Trainee $20  
(Module ID 29403-16) Covers the setup of GTAW equipment for welding aluminum plate. Explains how to clean and prepare aluminum plate coupons for welding. Addresses GTAW techniques used to make V-groove and modified U-groove welds on aluminum pipe with and without backing. Provides GTAW procedures on how to make V-groove or modified U-groove welds on aluminum pipe in the 2G, 5G, and 6G positions.

**Soldering and Brazing**
Trainee $20  
(Module ID 29405-16) Introduces the equipment, techniques, and materials used to safely join copper tubing through both brazing and soldering processes. Covers the required PPE, preparation, and work processes in detail. Also presents procedures for brazing copper to dissimilar materials such as steel.

---

To Order Call: 1-800-922-0579  
Stay Connected: [Facebook](https://www.facebook.com)  
[www.nccer.org/instructors](http://www.nccer.org/instructors)
Mobile Crane Operations

L1 MOBILE CRANE OPERATIONS

NEW!

<table>
<thead>
<tr>
<th>MODULES</th>
<th>Level 1</th>
<th>Trainee Guide:</th>
<th>ISBN</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Module ID 21101) Provides an overview of the entire course and highlights the duties and responsibilities of a mobile crane operator. Discusses ASME B30.5 and 29 CFR 1926, Subpart CC, as well as crane operator certification.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Module ID 21102) Introduces mobile crane equipment with an in-depth discussion of terminology and nomenclature. Explains the basic scientific principles associated with mobile crane operation.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Module ID 38102; from Basic Rigger)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crane Communications (10 Hours)</td>
<td>Trainee 20</td>
<td>$20</td>
<td>ISBN 978-0-13-498800-9</td>
</tr>
<tr>
<td>(Module ID 53101; from Signal Person)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Module ID 21106) Covers safety standards and best safety practices relevant to the operation of cranes. Describes safety considerations related to power lines, weather conditions, and specific crane functions.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Module ID 21105) Describes preparations and considerations prior to lifting operations. Provides an opportunity to become familiar with the operation of a crane and the functions of its controls.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

L2 MOBILE CRANE OPERATIONS

NEW!

<table>
<thead>
<tr>
<th>Curriculum Notes</th>
<th>Level 2</th>
<th>ISBN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modules</td>
<td>Trainee Guide: $97</td>
<td>978-0-13-473824-6</td>
</tr>
<tr>
<td>All of the modules listed below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Module ID 21202) Discusses the power systems that enable cranes to perform. Discusses diesel and gasoline/propane engines and electrical/motor-generator, as well as mechanical, electrical, pneumatic, and hydraulic power systems.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Module ID 21205) Provides information on load moment indicators, anti-two-block devices, load indicators, and other operator aids that are installed in cranes. Describes input devices associated with these operator aids and the information they provide.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Module ID 21204) Covers the components of wire rope and inspection requirements and procedures for wire rope, load blocks, and sheaves. Explains proper installation of wire rope, maintenance guidelines, and end terminations and preparations.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Module ID 21203) Covers the types of inspections typically performed on mobile cranes. Describes service requirements for crane maintenance.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load Dynamics (17.5 Hours)</td>
<td>Trainee 20</td>
<td>$20</td>
</tr>
<tr>
<td>(Module ID 21206) Covers leverage, forward and backward stability, operational quadrants, submargined lifts, non-centered lifts, and other forces that affect stability.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transporting Requirements (17.5 Hours)</td>
<td>Trainee 20</td>
<td>$20</td>
</tr>
<tr>
<td>(Module ID 21308) Discusses the proper handling, loading and unloading, and securing procedures for mobile cranes and their components. Presents information on driver requirements and procedures for securing the mobile crane for transporting.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Module ID 21207) Covers site hazards and restrictions that could hinder on-site crane movement; safety considerations involved in crane movement over uneven ground; pick-and-carry operations; and power line contact. Also addresses flotation capacity.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

L3 MOBILE CRANE OPERATIONS

NEW!

<table>
<thead>
<tr>
<th>Curriculum Notes</th>
<th>Level 3</th>
<th>ISBN</th>
</tr>
</thead>
<tbody>
<tr>
<td>All of the modules listed below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Module ID 21301) Discusses the importance of load charts and charts that apply to different configurations. Includes on-rubber, on-outrigger, jib, and deduction charts, as well as range diagrams and operational notes. Covers parts of line and capacity calculations.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Module ID 21304) Discusses lift plan implementation, including reference information, calculations, single- and multiple-crane lifting, critical lifts, and engineering considerations.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telescopic Boom Attachment Setup and Assembly (20 Hours)</td>
<td>Trainee 20</td>
<td>$20</td>
</tr>
<tr>
<td>(Module ID 21302) Covers the setup and stowing of swing-away extensions and various jibs, as well as the assembly of intermediate boom sections, on telescopic cranes. Includes the description and operating characteristics of manual and power lifting jibs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lattice Boom Assembly and Disassembly (20 Hours)</td>
<td>Trainee 20</td>
<td>$20</td>
</tr>
<tr>
<td>(Module ID 21306) Identifies lattice boom components and provides pre-/post-assembly considerations. Provides step-by-step guidance in the assembly and disassembly of lattice booms.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Module ID 21305) Examines ASME B30.23 and 29 CFR 1926.550(s) requirements while presenting advanced operational techniques for hoisting personnel.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Module ID 21303) Covers multi-crane lifts, critical lifts, blind lifts, and demolition. Includes sections on how to use magnet and vacuum lifting devices and how to operate a mobile crane in cold weather.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Rigger/Signal Person

BASIC RIGGER

**MODULES**

- **All of the modules below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.**

**Rigging Practices (15 Hours)**
Trainee $20
(Module ID 38102) Describes basic rigging and safety practices related to rigging activities. Describes the use and inspection of equipment and hardware used in rigging. Explains how to apply common hitches. Covers jacks and hoisting equipment.

**Crane Safety and Emergency Procedures (25 Hours)**
Trainee $20
ISBN 978-0-13-498819-0
(Module ID 21106; from Mobile Crane Operations Level One)
Trainee $20
Basic Principles of Cranes (15 Hours)
Trainee $20
Crane Communications (10 Hours)
Trainee $20
(Module ID 53101) Describes the communication process between the signal person and the crane operator. Covers electronic communications as well as the standard hand signals in 29 CFR 1926.

**INTERMEDIATE RIGGER**

**Curriculum Notes**
- **NEW!**
- 105 Hours
- Updated in 2018.
- Downloadable instructor resources that include module tests, PowerPoint®s, and performance profile sheets are available at www.nccer.org/irc.

**PAPERBACK**
Trainee Guide: $49

**ADVANCED RIGGER**

**Curriculum Notes**
- **NEW!**
- 95 Hours
- Updated in 2018.
- Downloadable instructor resources that include module tests, PowerPoint®s, and performance profile sheets are available at www.nccer.org/irc.

**PAPERBACK**
Trainee Guide: $49

**MODULES**

- **All of the modules below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.**

**Intermediate Rigging (17.5 Hours)**
Trainee $20
(Module ID 38201) Describes basic procedures for using various slings in hitches and calculating sling stress. Introduces tools and equipment used for the lateral movement of loads without a crane. Trainees learn how to reeve block and tackle, invert loads with hoists, and drift a load between two hoists.

**Load Dynamics (17.5 Hours)**
Trainee $20
(Module ID 21206; from Mobile Crane Operations Level Two)
Trainee $20
Wire Rope (25 Hours)
Trainee $20
(Module ID 21204; from Mobile Crane Operations Level Two)
Trainee $20
Telescopic Boom Attachment Setup and Assembly (20 Hours)
Trainee $20
(Module ID 21302; from Mobile Crane Operations Level Three)
Trainee $20
Lattice Boom Assembly and Disassembly (25 Hours)
Trainee $20
(Module ID 21306; from Mobile Crane Operations Level Three)
Trainee $20

**SIGNAL PERSON**

**Hoisting Personnel (20 Hours)**
Trainee $20
(Module ID 21305; from Mobile Crane Operations Level Three)

**MODULES**

- **All of the modules below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.**

**Cranes Communications (10 Hours)**
Trainee $20
(Module ID 53101) Describes the communication process between the signal person and the crane operator. Covers electronic communications as well as the standard hand signals in 29 CFR 1926.

**Basic Principles of Cranes (15 Hours)**
Trainee $20
(Module ID 21102; from Mobile Crane Operations Level One)
Trainee $20
Crane Safety and Emergency Procedures (25 Hours)
Trainee $20
(Module ID 21106; from Mobile Crane Operations Level One)

**Curriculum Notes**
- **NEW!**
- 50 Hours
- Updated in 2018.
- Downloadable instructor resources that include module tests, PowerPoint®s, and performance profile sheets are available at www.nccer.org/irc.

**PAPERBACK**
Trainee Guide: $49

**MODULES**

- **All of the modules below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.**

**Advanced Rigging (20 Hours)**
Trainee $20
(Module ID 38301) Explains how load weight and center of gravity affect lifting and crane stability. Load calculations for multi-crane lifts are presented, along with the application of equalizer beams. The movement of loads up an inclined plane and the line pull required are examined in detail. The module concludes with guidance in the rigging and handling of rebar bundles.

**Load Charts (35 Hours)**
Trainee $20
(Module ID 21301; from Mobile Crane Operations Level Three)
Trainee $20

**Lift Planning (20 Hours)**
Trainee $20
(Module ID 21304; from Mobile Crane Operations Level Two)
### Tower Crane Operator

**Orientation to the Trade** (5 Hours)  
Trainee $20  
(Module ID 48101-10) Provides an overview of the tower crane industry and highlights the duties and responsibilities of a tower crane operator. Discusses ASME and OSHA standards, as well as career opportunities and operator requirements.

**Basic Principles of Tower Cranes** (20 Hours)  
Trainee $20  
(Module ID 48102-10) Identifies the three main types of tower cranes and their components, including operator aids and base support systems. Explains the basic scientific principles associated with tower crane operation. Discusses the factors that affect lifting capacities.

**Tower Crane Safety** (15 Hours)  
Trainee $20  
(Module ID 48103-10) Introduces various safety aspects of tower crane operation, including equipment inspection, rigging, swing paths, and site hazard identification.

**Rigging Practices** (15 Hours)  
Trainee $20  
(Module ID 48104-10) Describes the use and inspection of basic equipment and hardware used in rigging, including slings, wire rope, chains, lifting beams, and attaching hardware such as shackles, eyebolts, and hooks. Explains sling capacities and sling angles.

**Operating a Tower Crane** (25 Hours)  
Trainee $20  
(Module ID 48107-10) Describes the basic functions of a tower crane, as well as standard procedures for starting up and shutting down self-erecting, luffing boom, and hammerhead tower cranes. Provides an opportunity for trainees to become familiar with the actual operation of a tower crane and the functions of its controls.

**Load Charts** (15 Hours)  
Trainee $20  
(Module ID 48105-10) Explains how to use load charts to calculate safe lifting capacities for self-erecting, lifting boom, and hammerhead tower cranes. Also covers parts of line and counterweight configurations.

**Communications** (10 Hours)  
Trainee $20  
(Module ID 48106-10) Covers the fundamentals of the communication process, including verbal and nonverbal methods of communication. Also presents the ASME B30.3 hand signals, including the appropriate operator action when the signal is given.

**Alternative Energy**

**Introduction to Alternative Energy** (25 Hours)  
Trainee $20  
(Module ID 74101-11) Identifies the need for alternative energy development. Describes the contributions and potential of individual alternative energy sources. Also covers the present U.S. electrical grid and issues affecting specific alternative energy source tie-in and reliability.

**Biomass and Biofuels** (22.5 Hours)  
Trainee $20  
(Module ID 74102-11) Defines potential sources of biomass and biofuels and discusses their advantages and disadvantages for energy production. Discusses the future of biomass as well as biomass energy applications.

**Wind Power** (22.5 Hours)  
Trainee $20  
(Module ID 74105-11) Describes wind power and how it is harnessed. Identifies the advantages and disadvantages of solar energy. Discusses the past, present, and future of solar energy, as well as solar PV applications.

**Solar Power** (25 Hours)  
Trainee $20  
(Module ID 74104-11) Describes solar photovoltaic (PV) power and how it is harnessed. Identifies the advantages and disadvantages of solar energy. Discusses the past, present, and future of solar energy, as well as solar PV applications.

**Nuclear Power** (25 Hours)  
Trainee $20  
(Module ID 74103-11) Describes nuclear power and its sources. Discusses the advantages and disadvantages of nuclear power, the future of nuclear energy, and nuclear power generation.
Solar Photovoltaics

**Introduction to Solar Photovoltaics** (40 Hours)
Trainee S21
(Module ID 57101-11) Covers the basic concepts of PV systems and their components, along with general sizing and electrical/mechanical design requirements. Provides an overview of performance analysis and troubleshooting. Successful completion of this module will help prepare trainees for the North American Board of Certified Energy Practitioners (NABCEP) PV Entry Level Exam.

**Site Assessment** (10 Hours)
Trainee S20
ISBN 978-0-13-266202-4
(Module ID 57102-11) Explains how to determine customer needs, assess site-specific safety hazards, conduct a site survey, and identify a suitable location for the PV array and other system components. Also explains how to acquire and interpret site solar radiation and temperature data.

**System Design** (25 Hours)
Trainee S20
(Module ID 57103-11) Describes system design considerations, including array configurations, component selection, and wire sizing. Covers bonding, grounding, and the selection of overcurrent protection and disconnects.

**System Installation and Inspection** (60 Hours)
Trainee S20
(Module ID 57104-11) Explains how to use the information from the site assessment and system design documents to safely install a photovoltaic array and other system components.

**Maintenance and Troubleshooting** (10 Hours)
Trainee S20
(Module ID 57105-11) Covers basic system performance monitoring and troubleshooting procedures, including record-keeping requirements.

---

**Sustainable Construction Supervisor**

This module has been endorsed and approved by GBCI for 20 general and LEED-specific continuing education hours for credential maintenance. A related assessment certification exam, developed by NCCER and endorsed by GBCI, is available. For more information, contact NCCER Customer Service at 1-888-622-3720.

This craft requires additional instructor qualifications. For more information, contact NCCER Customer Service at 1-888-622-3720 or visit the craft page at nccer.org.

---

**Your Role in the Green Environment**

Geared to entry-level craft workers, Your Role in the Green Environment provides pertinent information concerning the green environment, construction practices, and building rating systems. This edition has been updated to reflect LEED v4 with emphasis on standards for building design and construction. The updated content features contemporary issues such as net zero buildings and an expanded focus on issues relevant to international construction.

In addition to being updated to reflect LEED v4, this edition features NCCER’s new instructional design, which includes organizing the material in a layout that mirrors the learning objectives. In addition, the PowerPoint modules are more robust and detailed lesson plans are available. The lesson plans include green building laboratory exercises in carpentry, electrical, plumbing, and HVAC. The culminating project is a two-bedroom home, with kitchen, bathroom, laundry room, and open space. Material lists, construction methods, and a framing plan are included.

Your Role in the Green Environment LEED v4, Third Edition, has been approved by GBCI 15 hours of general continuing education to support LEED professionals.

This craft requires additional instructor qualifications. For more information, contact NCCER Customer Service at 1-888-622-3720 or visit the craft page at nccer.org.
As energy efficiency is becoming a priority for homeowners across America, many are turning to the weatherization industry to assist in their efforts. NCCER’s Weatherization program offers training that exceeds the existing standards for weatherization technicians, crew chiefs, and building auditors. This program combines existing NCCER curricula with new building science modules that address the specific needs of this industry. Dual credentials are available within this program. Note: Instructors wishing to teach NCCER’s Weatherization program must meet specific qualifications. For more information, contact NCCER Customer Service at 1-888-622-3720.

### Introduction to Weatherization

17.5 Hours  
Published: 2010  
Module ID 59101-10

PAPERBACK  

Introduces the purpose and benefits of the weatherization program. Explains how weatherization goals are met by reducing heating and cooling losses and how infiltration points are located. Approved for 17.5 continuing education hours under GBCI’s credential maintenance program.

- Downloadable instructor resources that include module tests, PowerPoint®, and performance profile sheets are available at www.nccer.org/irc.

### Weatherization Green Value Pack

The Weatherization Green Value Pack combines the Core Curriculum, Introduction to Weatherization, Weatherization Technician Level One, and Your Role in the Green Environment to offer a curriculum package that meets the needs of organizations implementing green initiatives within their programs. This curriculum package also meets Perkins requirements and state guidelines for contact hours within high school programs.

- **Trainee Guide:** $67  
PAPERBACK  

### Weatherization Technician Level 1

- **Level 1**
- 145 Hours (Includes 90 hours of Fundamentals of Weatherization which is a prerequisite for Level One completion and must be purchased separately.)
- Published: 2010
- Downloadable instructor resources that include module tests, PowerPoint®, and performance profile sheets are available at www.nccer.org/irc.

#### Curriculum Notes

- 90 Hours
- Published: 2010
- Introduction to Weatherization, combined with NCCER’s Core Curriculum, makes up Fundamentals of Weatherization and is intended to introduce trainees to the concepts and skills they will need to successfully complete Weatherization Technician Level One. See p. 14 for detailed contents of Core Curriculum.

PAPERBACK  
Trainee Guide: $67  

### Weatherization Technician Level 2

- **Level 2**
- 162.5 Hours
- Published: 2011
- Downloadable instructor resources that include module tests, PowerPoint®, and performance profile sheets are available at www.nccer.org/irc.

#### Curriculum Notes

- 17.5 Hours
- Published: 2011
- Sealing the Building Envelope (25 Hours)
  - Trainee S20  
  - (Module ID 59102-10) Describes how to correct heat losses and gains by applying insulating materials to uninsulated areas of the building envelope. Describes how to reduce air infiltration by applying caulk and other materials. Also explains how to patch drywall and install weatherstripping.

#### Insulating Pipes, Ducts, and Water Heaters (10 Hours)
  - Trainee S20  
  - (Module ID 59103-10) Describes how to insulate water pipes and water heaters, and explains how to make simple duct system repairs, seal air leaks in a duct system, and insulate ducts to reduce heat loss.

#### MODULES

- All of the modules below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

**Wood and Masonry Construction Methods** (12.5 Hours)  
- (Module ID 33102-10; from Electronic Systems Technician Level One)  
  - Trainee S20  

**Thermal & Moisture Protection** (7.5 Hours)  
- (Module ID 27203-07; from Carpentry Level Two, Fourth Edition)  
  - Trainee S20  

### Weatherization Crew Chief Level 2

- **Level 2**
- 25 Hours
- Published: 2011
- Downloadable instructor resources that include module tests, PowerPoint®, and performance profile sheets are available at www.nccer.org/irc.

#### Curriculum Notes

- 17.5 Hours
- Published: 2011
- Sealing the Building Envelope (25 Hours)
  - Trainee S20  
  - (Module ID 59102-10) Describes how to correct heat losses and gains by applying insulating materials to uninsulated areas of the building envelope. Describes how to reduce air infiltration by applying caulk and other materials. Also explains how to patch drywall and install weatherstripping.

#### Insulating Pipes, Ducts, and Water Heaters (10 Hours)
  - Trainee S20  
  - (Module ID 59103-10) Describes how to insulate water pipes and water heaters, and explains how to make simple duct system repairs, seal air leaks in a duct system, and insulate ducts to reduce heat loss.

#### MODULES

- All of the modules below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

**Concrete and Steel Construction Methods** (12.5 Hours)  
- (Module ID 33103-10; from Electronic Systems Technician Level One)  
  - Trainee S20  
Weatherization Level 2 (continued)

Commercial Drawings (25 Hours)
(Module ID 27201-07; from Carpentry Level Two, Fourth Edition)
Trainee $20

Introduction to Supervisory Skills (15 Hours)
(Module ID 03410-09; from HVAC Level Four, Third Edition)
Trainee $20

Introduction to Cooling (30 Hours)
(Module ID 03107-07; from HVAC Level One, Third Edition)
Trainee $20

Introduction to Heating (15 Hours)
(Module ID 03108-07; from HVAC Level One, Third Edition)
Trainee $20

Chimneys, Vents, and Flues (5 Hours)
(Module ID 03202-07; from HVAC Level Two, Third Edition)
Trainee $20

Air Distribution Systems (10 Hours)
(Module ID 03109-07; from HVAC Level One, Third Edition)
Trainee $20

Air Quality Equipment (5 Hours)
(Module ID 03204-07; from HVAC Level Two, Third Edition)
Trainee $20

Indoor Air Quality (15 Hours)
(Module ID 03403-09; from HVAC Level Four, Third Edition)
Trainee $20

Diagnostics and Management Practices (30 Hours)
Trainee $20

• Volume 1: 197.5 Hours (Includes 100 hours of Power Industry Fundamentals, which is a prerequisite for Level 1 completion and must be purchased separately. See p. 82 for ordering information.)
• Volume 2: 110 Hours
• Published: 2011

L2 BUILDING AUDITOR
LEVEL 2

Curriculum Notes

• 172.5 Hours
• Published: 2011
• Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK

MODULES

• All of the modules below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

Trade Mathematics (10 Hours)
(Module ID 03102-07; from HVAC Level One, Third Edition)
Trainee $20

Introduction to Cooling (30 Hours)
(Module ID 03107-07; from HVAC Level One, Third Edition)
Trainee $20

Introduction to Heating (15 Hours)
(Module ID 03108-07; from HVAC Level One, Third Edition)
Trainee $20

Chimneys, Vents, and Flues (5 Hours)
(Module ID 03202-07; from HVAC Level Two, Third Edition)
Trainee $20

Introduction to Supervisory Skills (15 Hours)
(Module ID 03410-09; from HVAC Level Four, Third Edition)
Trainee $20

Alternative Heating and Cooling Systems (10 Hours)
(Module ID 03409-09; from HVAC Level Four, Third Edition)
Trainee $20

Performing a Building Audit (42.5 hours)
Trainee $20

Energy Conservation Equipment (5 Hours)
(Module ID 03404-09; from HVAC Level Four, Third Edition)
Trainee $20

Energy Conservation Equipment (25 Hours)
(Module ID 03407-09; from HVAC Level Four, Third Edition)
Trainee $20

Indoor Air Quality (15 Hours)
(Module ID 03403-09; from HVAC Level Four, Third Edition)
Trainee $20

Introduction to Hydronic Systems (10 Hours)
(Module ID 03203-07; from HVAC Level Two, Third Edition)
Trainee $20
ISBN 978-0-13-266312-0

Heating and Cooling System Design (25 Hours)
(Module ID 03407-09; from HVAC Level Four, Third Edition)
Trainee $20

Introduction to Supervisory Skills (15 Hours)
(Module ID 03410-09; from HVAC Level Four, Third Edition)
Trainee $20

Introduction to Cooling (30 Hours)
(Module ID 03107-07; from HVAC Level One, Third Edition)
Trainee $20

Introduction to Heating (15 Hours)
(Module ID 03108-07; from HVAC Level One, Third Edition)
Trainee $20

Chimneys, Vents, and Flues (5 Hours)
(Module ID 03202-07; from HVAC Level Two, Third Edition)
Trainee $20

Introduction to Wind Energy (15 Hours)
Trainee $22

Wind Energy

• Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

Introduction to Wind Energy (Module ID 58101-11) has been approved for 15 general continuing education hours under GBCI’s Credential Maintenance Program.

PAPERBACK

VOLUME 1

MODULES

• All of the modules below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

Introduction to Wind Energy (15 Hours)
Trainee $22

L1 WIND TURBINE MAINTENANCE TECHNICIAN
LEVEL 1

Curriculum Notes

• Volume 1: 197.5 Hours (Includes 100 hours of Power Industry Fundamentals, which is a prerequisite for Level 1 completion and must be purchased separately. See p. 82 for ordering information.)
• Volume 2: 110 Hours
• Published: 2011

To Order Call: 1-800-922-0579
Stay Connected www.nccer.org/instructors

65
**Wind Energy (continued)**

**Introduction to Wind Turbine Safety** (12.5 Hours)
(Module ID 58102-11) Introduces safety concerns of working inside the wind turbine and in the wind farm environment. Expands on earlier safety training and provides coverage of electrical arc flash safety.

**Climbing Wind Towers** (40 Hours)
(Module ID 58103-11) Covers all aspects of climbing wind turbine lattice towers and tubular towers. Discusses proper climbing equipment and equipment inspection, environmental hazards, proper climbing techniques, and common wind turbine safe climbing guidelines.

**Introduction to Electrical Circuits** (7.5 Hours)
(Module ID 26103-11; from Electrical Level One, Seventh Edition)

**Electrical Theory** (7.5 Hours)
(Module ID 26104-11; from Electrical Level One, Seventh Edition)

**Electrical Test Equipment** (5 Hours)
(Module ID 26112-11; from Electrical Level One, Seventh Edition)

**Electrical Wiring** (10 Hours)
(Module ID 58104-11) Describes types and applications of conductors as well as their installation techniques. Also describes the technique and components used for terminating and splicing conductors.

**V2 VOLUME 2**

**MODULES**

All of the modules below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

**Alternating Current and Three-Phase Systems** (17.5 Hours)  
(Module ID 80201-11; from Power Line Worker, Distribution Level Two)

**Circuit Breakers and Fuses** (10 Hours)
(Module ID 58105-11) Explains the necessity of overcurrent protection and the way it is applied in the wind turbine environment. Explores the operation of common circuit breakers and the differences in various fuse types. Overcurrent device terminology is presented, along with a review of the information found on such devices.

**Switching Devices** (12.5 Hours)
(Module ID 58106-11) Provides coverage of switching devices related to the power distribution and control of wind turbines. Mechanical and solid-state relay types are presented, as well as typical wind turbine control wiring diagrams. Explains various time delay schemes and how they can be applied.

**Wind Turbine Power Distribution Systems** (12.5 Hours)
(Module ID 58107-11) Discusses the basics of power generation and the generators used in wind turbines. Reviews how power is distributed and controlled during various modes of wind turbine operation. Simple one-line diagrams are also covered.

**Fasteners and Torquing** (20 Hours)
(Module ID 58108-11) Presents comprehensive coverage of wind turbine fasteners and their required characteristics. Covers torque theory, torquing, tensioning, and hydraulic torquing equipment. Presents the use and care of all significant torquing and tensioning tools. The use of taps and dies is also introduced.

**Introduction to Bearings** (15 Hours)
(Module ID 58109-11) Explores basic lubrication theory and related equipment. Includes the different applications and types of lubricants used in the wind turbine environment. Reviews OSHA’s hazard communication program and the EPA’s hazardous waste control program. Includes in-depth coverage of material safety data sheets.

**Introduction to Hydraulic Systems** (10 Hours)
(Module ID 58110-11) Covers all aspects of common hydraulic systems, including fluids, system components, and pumps. Presents the principles of hydraulic system operation and the related components. Simple hydraulic system maintenance is also introduced.

---

**GREEN TOPICS IN HVAC**

In the typical American household, heating, cooling and lighting consumes 67% of all the electricity that’s generated. With buildings being the leading source of greenhouse gas emissions, it is no surprise that HVAC systems have become primary targets in this energy conservation battle. In these four modules, we explore the methods and opportunities for increasing the efficiency of energy use and the quality of air that we breathe. These modules have been individually approved by GBCI for continuing education (CE) under its Credential Maintenance Program. CE hours are included next to the Module titles.

**Spiral Bound**

**MODULES**

- Air Quality Equipment (5 Hours)  03204-07
- Indoor Air Quality (12.5 Hours)  03403-09
- Energy Conservation Equipment (10 Hours)  03404-09
- Alternative Heating and Cooling Systems (10 Hours)  03409-09
**Management Learning Series**

The Management Learning Series provides companies with the tools to develop qualified management personnel. From Fundamentals of Crew Leadership to Project Supervision to Project Management, these programs provide an answer to the management shortage crisis impacting companies today and expected to continue for the foreseeable future.

---

**Fundamentals of Crew Leadership**

**PROJECT SUPERVISION**

**Curriculum Notes**

- 85 Hours
- Published: 2001

**PAPERBACK**

Participant Guide: $95


---

**Modules**

All of the modules listed below are included in the Participant Guide. The following ISBN and pricing information is for ordering individual modules only.

**Orientation to the Job** (5 Hours)

Participant S20


(Module ID MT201-01) Introduces the history of the construction industry and construction organization. Covers the phases of a construction project and the role and duties of the supervisor.

**Human Relations and Problem Solving** (20 Hours)

Participant S20


(Module ID MT202-01) Focuses on the communication process and developing effective communication and leadership skills. Compares problem solving to decision making. Discusses potential human relations difficulties and how to resolve them.

---

**Safety** (7.5 Hours)

Participant S20

ISBN 978-0-13-103668-0

(Module ID MT203-01) Describes the supervisor’s role in job-site safety, the true cost of accidents, and how to train and involve all employees in job safety. Includes OSHA safety inspections.

**Quality Control** (5 Hours)

Participant S20


(Module ID MT204-01) Defines different types of quality control. Explains how to incorporate quality and safety through effective communication, document control, and inspections.

**Contract and Construction Documents** (5 Hours)

Participant S20


(Module ID MT205-01) Teaches how to understand and interpret construction drawings, technical specifications, and as-built drawings. Includes different types of bidding, contracts, change orders, closeout documents, and more.

**Document Control and Estimating** (10 Hours)

Participant S20

ISBN 978-0-13-103671-0

(Module ID MT206-01) Provides an introduction to using and maintaining document control. Defines the elements of material, labor, and equipment estimates and how to develop, organize, and look for errors in an estimate.

---

**Planning and Scheduling** (17.5 Hours)

Participant S20


(Module ID MT207-01) Introduces stages of planning, how to implement a plan, and how to coordinate with other contractors. Includes planning resources, materials, equipment, tools, and labor. Discusses short- and long-term schedules.

---

**Resource Control and Cost Awareness** (15 Hours)

Participant S20


(Module ID MT208-01) Explains how to measure job-site productivity and how to increase it. Discusses resources, materials, tools, equipment, labor, quality, and cost and resource control. Introduces cost awareness and types of reports.

---

**Sustainable Construction Supervisor**

Sustainable Construction Supervisor has been developed to instruct construction managers on sustainable construction management, the LEED rating system as it would apply to oversight of their projects and crews, and how to supervise and train their subcontractors and crews so that LEED points aren’t unintentionally sacrificed. This module is published in full color and is competency-based. An assessment is also available. For more information, see p. 63.
To Order Call: 1-800-922-0579 www.nccer.org/instructors

Stay Connected:

Project Management

Curriculum Notes

- 115 Hours
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

Participant Guide: $98

PROJECT MANAGEMENT

MODULES

All of the modules listed below are included in the Participant Guide. The following ISBN and pricing information is for ordering individual modules only.

Introduction to Project Management (2.5 Hours)
Participant $20
Module ID 44101-08 (ISBN 978-0-13-603845-0)
Introduces the role and responsibilities of project management, including technical and management skills. Presents an overview of the phases in a construction project and describes alternate project delivery methods.

Safety (2.5 Hours)
Participant $20
Stresses the importance of job-site safety and identifies the project manager’s duties and responsibilities regarding safety. Covers loss prevention and creating a zero-accident work environment. Presents several checklists as references.

Interpersonal Skills (12.5 Hours)
Participant $20
Module ID 44103-08 (ISBN 978-0-13-603845-0)
Discusses the values and expectations of the workforce, building relationships, and satisfying stakeholders. Describes the principles of effective communication, applying the management grid, and using relationship skills to create a leadership environment. Also discusses behavioral interviewing and professional development of personnel.

Issues and Resolutions (15 Hours)
Participant $20
Describes the key elements of successful negotiations and negotiating techniques. Explains how to recognize nonverbal signals, use negotiating tools, and apply conflict resolution strategies. Identifies symptoms and barriers to solving project-related problems and applying problem-solving techniques, brainstorming, and identifying root cause consequences.

Construction Documents (10 Hours)
Participant $20
Emphasizes the importance of documentation and explains the types of documents, drawings, and specifications used on a project. Explains methods of obtaining work in the industry and types of contracts and insurance requirements. Describes the change order process and the documents required to close out a project.

Construction Planning (10 Hours)
Participant $20
Discusses the importance of formal job planning and creating a performance-based work environment. Discusses the Work Breakdown Structure (WBS) as the foundation that identifies deliverables, tasks, and time. Introduces the basics of quality control and defines the roles and responsibilities of an effective team and how to allocate resources.

Estimating and Cost Control (15 Hours)
Participant $20
Emphasizes the importance of accurate estimating and summarizes the estimating process and the steps in developing an estimate. Defines the purpose of a cost control methodology, explains how to perform simple cost analysis, and covers the project manager’s role in controlling cost and tracking rework cost.

Scheduling (15 Hours)
Participant $20
Explains the basics of scheduling from simple to-do lists through bar charts, network diagrams, and methods of managing resources. Discusses the importance of formal schedules, job planning, and establishing priorities. Describes alternative scheduling methods.

Resource Control (10 Hours)
Participant $20
Module ID 44109-08 (ISBN 978-0-13-603816-0)
Identifies resources that must be controlled, factors that affect production control, and production control standards. Explains the project manager’s role in the process. Defines production and productivity, and describes how to evaluate and improve production control and productivity.

Quality Control and Assurance (5 Hours)
Participant $20
Defines quality control and quality assurance, and stresses management’s concern about quality. Explains project quality management and how to develop an effective quality control plan. Discusses how to identify, assess, and measure weaknesses to avoid rework.

Continuous Improvement (5 Hours)
Participant $20
Describes the project manager’s role in creating a culture of continuous improvement. Explains the fundamentals of a continuous improvement program and how to identify the critical problems and processes that require improvement, implement a continuous improvement process, and measure results. Emphasizes the importance of satisfying internal and external stakeholders.

www.nccer.org/instructors
Maritime Industry Fundamentals

Maritime Pipefitting

**Maritime Pipefitting Trade Math** (15 hours)
Trainee Guide: $20
ISBN 978-0-13-340591-0
(Module ID 85102-13) Explains how to solve a wide variety of maritime pipefitting math problems, including those related to common geometrical figures. The process of determining lengths in pipe offsets for general and rolling offsets is also presented.

**Pipefitting Hand Tools** (20 hours)
Trainee Guide: $20
(Module ID 85103-13) Covers hand tool safety, as well as procedures for selecting, inspecting, using, and maintaining pipefitting hand tools. Includes pipe wrenches, pipe stands, pipe vises, levels, and pipe fabrication tools and aids.

**Pipefitting Power Tools** (15 hours)
Trainee Guide: $20
ISBN 978-0-13-340593-4
(Module ID 85104-13) Covers power tool safety and procedures for selecting, inspecting, using, and maintaining power tools that are common in the maritime environment. Procedures for threading pipe are provided in a step-by-step format. Guidelines for both electrical and pneumatic tools are provided.

**Oxyfuel Cutting** (17.5 hours)
Trainee Guide: $20
(Module ID 85105-13) Describes the procedures and safety requirements related to oxyfuel cutting. Detailed instructions for setting up, lighting, and using oxyfuel cutting torches are provided. Common techniques, such as straight line cutting, beveling, washing, and gouging are reviewed. Oxyfuel gas supply arrangements from both cylinders and manifolds are also presented.

**Ladders and Scaffolds** (12.5 hours)
Trainee Guide: $20
(Module ID 85106-13) Explains how to identify various types of ladder and scaffold systems and describes their safe use. The pre-use inspection requirements for both ladders and scaffolds are presented.

**Piping Systems** (5 hours)
Trainee Guide: $20
(Module ID 85201-13) Identifies and explains basic types of piping systems found in the maritime environment and the materials used for various applications. Explains how thermal expansion in piping systems can be accommodated. Includes coverage of common insulation types and installation practices.
Maritime Pipefitting Level 2

Butt Weld Pipe Fabrication (37.5 hours)
Trainee $20
(Module ID 85202-13) Describes the pipe fittings used for maritime butt welded piping systems and how to determine the lengths of pipe between points of connection. Explains how to prepare and fit both pipe and fittings, and how to select backing rings when required.

Socket Weld Pipe Fabrication (25 hours)
Trainee $20
(Module ID 85203-13) Describes the pipe fittings used for maritime socket welded piping systems and how to determine the lengths of pipe between points of connection. Explains how to prepare and fit both pipe and fittings.

Brazing (12.5 hours)
Trainee $20
(Module ID 85204-13) Describes the procedures for preparing various types of pipe and tubing for brazing, as well as the brazing process. Discusses the selection of brazing filler metals for various applications.

Threaded Pipe Fabrication (15 hours)
Trainee $20
(Module ID 85205-13) Describes the pipe fittings used for maritime threaded piping systems and how to determine the lengths of pipe between points of connection. Explains how to prepare and fit both pipe and fittings, and how to assemble threaded pipe components.

Fiberglass and Plastic Pipe (12.5 hours)
Trainee $20
(Module ID 85206-13) Introduces various types of fiberglass and plastic pipe and their maritime applications. Explains how fiberglass and plastic piping materials are measured, cut, and joined.

Maritime Structural Fitter

Weld Quality (10 Hours)
(Module ID 29106-09; from Welding Level One, Fourth Edition)
Trainee $20

Shielded Metal Arc Welding – Electrodes (2.5 Hours)
(Module ID 29108-09; from Welding Level One, Fourth Edition)
Trainee $20

Tack Welding (40 Hours)
(Module ID 86101-14) Describes how to set up welding equipment, strike an arc, and make tack welds in order to maintain proper alignment of parts in anticipation of finish welding. Covers the machines, tools, and techniques used to make tack welds in various positions.

Fire Watch (5 Hours)
(Module ID 86102-14) Prepares a worker to perform fire watch duties in support of welding and flame cutting activities. Describes the classes of fires and the methods used to extinguish them, as well as the responsibilities of a person assigned as a fire watch.

Introduction to Structural Fitter Drawings (10 Hours)
(Module ID 86103-14) Covers fundamental skills needed to read fabrication drawings that are commonly used by structural fitters. Focuses on basic drawing elements such as title blocks, revision blocks, and drafting lines and introduces plan, elevation, and detail drawings.

Fitting One (40 Hours)
(Module ID 86104-14) Introduces layout tools, fitting tools, and fitting aids used to fit up and align plate joints. Incorporates hands-on tasks through which the beginning fitter will learn how to perform basic layout, alignment, and fit-up tasks.

Fitting Two (140 Hours)
(Module ID 86203-14) Explains selection and application of gaskets and packings, fit-up tasks, and inspection of finished work. Also covers structural accessories, proper measuring techniques, and creating a materials list.

Identifying Valves, Flanges, and Gaskets (20 Hours)
Trainee $20
(Module ID 85207-13) Describes and identifies various types of valves, flanges, and gaskets used in the maritime environment. Factors related to valve selection as well as their storage, handling, and installation are presented. The various flange styles and related gasket materials are described, as well as their common installation procedures.

Drawings and Detail Sheets (20 Hours)
Trainee $20

(Module ID 85208-13) Identifies the types and parts of drawings commonly used by maritime pipelayers. Explains how to interpret the information contained in pipe drawings to create the desired piping system.
Maritime Structural Fitter Level 3

**MODULES**
All of the modules below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

**MARITIME STRUCTURAL FITTER**

**LEVEL 3**

**Curriculum Notes**
- 237.5 Hours
- Published: 2016
- Downloadable instructor resources that include module tests, PowerPoint®, and performance profile sheets are available at www.nccer.org/irc.

**PAPERBACK**

**Advanced Structural Print Reading** (40 Hours)
(Module ID 86301-15) Focuses on learning to interpret ship construction drawings, ranging from the highest level general arrangement drawing to the lowest level piece-part drawing. Includes a set of drawings.

**Fitting Three** (80 Hours)
(Module ID 86302-15) Provides an overview of the ship construction process, from the lowest subassembly to the erection of the vessel itself. Illustrates laying out the locations of equipment and structural members, installing the equipment and structural members, and the use of leveling and alignment equipment.

**GMAW and FCAW – Equipment and Filler Metals** (10 Hours)
(Module ID 29205-09; from Welding Level Two, Fourth Edition)

**GMAW and FCAW – Plate** (80 Hours)
(Module ID 29206-09; from Welding Level Two, Fourth Edition)

**Physical Characteristics and Mechanical Properties of Metals** (7.5 Hours)

**Fundamentals of Crew Leadership** (20 Hours)
Trainee ISBN 978-0-13-414493-1
(Module ID 46101-11, Second Edition) Covers basic leadership skills and explains different leadership styles, communication, delegating, and problem solving. Jobsite safety and the crew leader’s role in safety are discussed, as well as project planning, scheduling, and estimating. Includes performance tasks to assist the learning process.

**NCCER Pipeline Program**
The NCCER Pipeline Program is now more flexible than ever. Whether you are looking for covered task modules with knowledge and performance tests to meet Operator Qualifications (OQ), or you are looking for a comprehensive training program for your classes, NCCER has it all.

The following pages make it easy for you to order exactly what you need:

- The full training program is listed on pages 78-88 showing the printed books you can order. These books consist of modules compiled together to provide levels of training for pipeline professionals.
- Individual covered task modules to train for Operator Qualification (OQ) can be found online at www.nccer.org/pipeline and can be ordered individually as online ebooks through the VitalSource website or can be ordered in print when purchased as full books. Lesson plans, PowerPoint® and Performance Profiles are accessible through the Instructor Resource Center.

Further information on NCCER’s Pipeline Program can be found at www.nccer.org/pipeline.

**Pipeline Covered Tasks**

A list of NCCER’s 127 covered task training modules can be found on www.nccer.org/pipeline. Each of these modules focus solely on the covered task that is indicated, align to API RP 1161 (3rd edition) and provide the knowledge necessary to pass the corresponding exams.

Further ordering information is available on the NCCER website at www.nccer.org/pipeline.
The newly established pipeline career pathway represented on this page provides the recognition pipeline professionals deserve through standardized training and industry-recognized credentials.

Levels of training have been established by combining training modules into specific focus areas within the industry. This allows trainees to progress through a standardized program and earn a professional credential.

In addition, Levels 2 and 3 are comprised of covered task training modules that can lead to Operator Qualifications (OQ). Pipeline Corrosion Control is the only exception providing covered task training in Level 1.

The blue boxes denote the professional credential that can be earned with successful completion of each program.

*A trained workforce is a safe and qualified workforce!*

Each of these titles have corresponding OQ. The Covered Task list is available online at www.nccer.org/pipeline
Level 2: Craft-Specific Training with Operator Qualification

Pipeline Operations (Control Center/Gas/Liquid)

Pipeline Maintenance

Pipeline Electrical and Instrumentation

Pipeline Corrosion Control

Level 3: Craft-Specific Training with Operator Qualification

Pipeline Mechanical

Pipeline Mechanical

Pipeline Operations Technician

Pipeline Mechanical Technician

Pipeline Maintenance Technician

Pipeline Corrosion Technician

Trained and Qualified Pipeline Professional Credential
Introduction to the Pipeline Industry

Introduction to the Pipeline Industry (15 Hours)
Trainee $20
(Module ID 66102-02) Introduces the pipeline industry, including pipeline products and flow paths, maps and drawings used in the industry, and basic pipeline operations. Also covers hydraulics, pipeline equipment, electrical power systems, and corrosion control. Regulations, documentation, and pipeline industry occupations are also described.

Tools of the Trade (7.5 Hours)
Trainee $20
(Module ID 62104-02) Explains use and care of hand and power tools used in the pipeline industry. Describes the use of welding equipment and meters and testers. Also discusses nondestructive testing and the uses of hydraulic cranes and heavy excavating equipment.

Pipeline Documentation (5 Hours)
Trainee $20
ISBN 978-0-13-415138-0
(Module ID 62105-02) Identifies alignment sheets used in the pipeline industry including maps, P&IDs, and electrical drawings. Also describes the types of documentation and document management required in the industry.

Basic Pipeline Hydraulics and Equipment (10 Hours)
Trainee $20
(Module ID 6101-02) Explains pipeline hydraulics safety, basic principles of hydraulic systems, hydraulic properties of petroleum products, pipeline design factors, and basic pipeline equipment.

Pipeline Communications (7.5 Hours)
Trainee $20
(Module ID 6103-02) Introduces channels of communications that must exist in pipeline operations, including internal communications with scheduling, operations, and maintenance; and external communications with contractors, the general public, regulatory agencies, and local, state, and federal government.

Basic Pipeline Pneumatics and Equipment (10 Hours)
Trainee $20
(Module ID 67102-02) Introduces the basics of pneumatic equipment. Topics include pneumatic safety and the physical characteristics of gas. A discussion of compressors, valves, meters, and other pipeline equipment and an overview on pipeline design also are included.

Pipeline Operations (40 Hours)
Trainee $20
(Module ID 64106-02) Describes pipeline system hydraulics and ASME ratings and standards. Discusses station control systems and recognizing and responding to AOCs. Also covers pigging operations and proving process meters.

Release Identification and Response (5 Hours)
Trainee $20
(Module ID 62103-02) Describes company environmental manuals and the DNR and EPA regulations. Explains the NRC and Coast Guard responsibilities and spill prevention. Covers soil contamination, release reporting and containment, hydrostatic testing, flaring/venting, and trash handling.

Abnormal Operating Conditions

Abnormal Operating Conditions Field and Gas

Abnormal Operating Conditions Control Center

Curriculum Notes
• 172.5 Hours (Includes 72.5 Hours of Core Curriculum, which is a prerequisite completion and must be purchased separately. See p. 14 for ordering information.)
• Revised: 2017, Third Edition
• Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK
Trainee Guide: $100

MODULES
All of the modules listed below are included in the Trainee Guide. The following pricing information is for ordering individual modules which can be purchased through the online bookstore at www.nccer.org/bookstore.

To Order Call: 1-800-922-0579 www.nccer.org/instructors

Stay Connected: facebook twitter

www.nccer.org/irc
Pipeline Electrical and Instrumentation

VOLUME 1

Pipeline E&I Safety (15 Hours)
Trainee $20
(Module ID 64102-02) Describes the types and uses of personal protective equipment and covers hazard communications. Covers lockout/tagout and MSDS requirements; safety rules, regulations, and tools; and worksite hazards.

Trade Math (40 Hours)
Trainee $20
(Module ID 64103-02) Presents instrumentation formulas and equations. Explains how to calculate load and amperage, and perform pipeline-specific E&I calculations. Also provides a description of conductors.

Electrical Theory (40 Hours)
Trainee $20
(Module ID 64104-02) Introduces the electrical concepts used in Ohm’s law as applied to DC series circuits. Discusses atomic theory, electromotive force, resistance, and electric power equations. Also introduces series, parallel, and series-parallel circuits. Covers resistive circuits, Kirchhoff’s voltage and current laws, and circuit analysis.

Tools of the Trade (15 Hours)
Trainee $20
(Module ID 64105-02) Identifies hand tools used in the pipeline E&I trade. Also explains trade-specific power tools, test equipment, and communication equipment.

VOLUME 2

Process Control Theory (40 Hours)
Trainee $20
(Module ID 64204-02) Explains process characteristics and control systems. Discusses control loop components and control loops and modes. Discusses types of control applications, including temperature, pressure, flow, and level control.

Supervisory Control Systems (15 Hours)
Trainee $20
(Module ID 64205-02) Explains pipeline supervisory control systems, PLCs, HMIs, and RTUs. Describes data highways and protocols, including data transfer methods, and SCADA-related communications, including transfer media, wireless radios, and Ethernet, and transmission and interface methods.

Transformers (25 Hours)
Trainee $20
(Module ID 64302-02) Explains power factor and medium versus low-voltage cable and MCCs. Describes types of switchgear and cables, feeders, fusing, and bracing. Includes testing and maintenance on switchgear and MCCs and associated components.

Low-Voltage and Standby Power (25 Hours)
Trainee $20
(Module ID 64303-02) Explains pipeline system standby generators, batteries, chargers, inverters, converters, and rotary and static UPSs. Also addresses the maintenance and testing of each.

Power Quality (25 Hours)
Trainee $20
(Module ID 64304-02) Explains power quality and types of defects, power systems, protection, and conditioning equipment. Discusses types of electrical noise and related problems, and possible solutions. Describes static electricity and its effect, system verification testing, and equipment maintenance.

Prime Movers (32.5 Hours)
Trainee $20
(Module ID 64305-02) Describes various electric motors and drives and their components. Discusses their maintenance and testing. Discusses engine types, cooling and lubrication systems, turbine operation, fuel sources, and controls.

Facility Auxiliary Systems (22.5 Hours)
Trainee $20
(Module ID 64306-02) Includes information on pipeline facility buildings and related systems, including fire, security, vapor recovery, injection, water treatment, cathodic protection, and blending systems.

SCADA (30 Hours)
Trainee $20
ISBN 978-0-13-103147-0
(Module ID 64307-02) Explains pipeline operations systems, including control, communications, SCADA, and PLCs. Explains redundant systems and control system troubleshooting.

To Order Call: 1-800-922-0579
Stay Connected: www.nccer.org/instructors
Pipeline Electrical and Instrumentation Level 2

**Curriculum Notes**
- 122.5 Hours
- Revised: 2017, Third Edition
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.
- Available as print on demand
- To purchase individual covered task modules, please visit www.nccer.org/bookstore.

**MODULES**
All of the modules listed below are included in the Trainee Guide. The following pricing information is for ordering individual modules which can be purchased through the online bookstore at www.nccer.org/bookstore.

**Abnormal Operating Conditions - Control Center** (5 Hours)
- Module ID AOCCC-17
- Trainee S20

**Abnormal Operating Conditions - Field and Gas** (5 Hours)
- Module ID AOCFG-17
- Trainee S20

**Trainee Guide**:

**VOLUME 1**
- Trainee Guide: $100

**Inspect, Test and Calibrate Pressure Switches** (7.5 Hours)
- Module ID CT25_1-17
- Trainee S20

**Inspect, Test and Calibrate Pressure Transmitters** (7.5 Hours)
- Module ID CT25_2-17
- Trainee S20

**Verify or Set Protection Parameters for Programmable Controllers and/or Other Instrumentation Control Loops** (15 Hours)
- Module ID CT26_0-17
- Trainee S20

**Test Overfill Protective Devices** (5 Hours)
- Module ID CT30_0-17
- Trainee S20

**Inspect and Calibrate Overfill Protective Devices** (7.5 Hours)
- Module ID CT31_0-17
- Trainee S20

**Inspect, Test, and Maintain Flow Computer for Hazardous Liquid Leak Detection** (7.5 Hours)
- Module ID CT44_3-17
- Trainee S20

**Inspection, Testing, and Perform Corrective and Preventative Maintenance of Tank Gauging for Hazardous Liquid Leak Detection** (7.5 Hours)
- Module ID CT44_4-17
- Trainee S20

**Prove Flow Meters for Hazardous Liquid Leak Detection** (7.5 Hours)
- Module ID CT44_5-17
- Trainee S20

**Maintain Flow Meters for Hazardous Liquid Leak Detection** (7.5 Hours)
- Module ID CT44_6-17
- Trainee S20

**Inspect, Test and Maintain Gravitometers/Densimeters for Hazardous Liquid Leak Detection** (7.5 Hours)
- Module ID CT44_7-17
- Trainee S20

**Maintain Fixed Gas Detection Equipment** (25 Hours)
- Module ID CT55_0-17
- Trainee S20

**Pipeline Maintenance and Mechanical Level 1**

**Curriculum Notes**
- Volume 1: 140 Hours
- Volume 2: 205 Hours
- Revised: 2017, Third Edition
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

**PAPERBACK**
**VOLUME 1**
- Trainee Guide: $100

**VOLUME 2**
- Trainee Guide: $100

**MODULES**
All of the modules listed below are included in the Trainee Guide. The following pricing information is for ordering individual modules which can be purchased through the online bookstore at www.nccer.org/bookstore.

**Tubing, Threaded Pipe, and Hoses** (30 Hours)
- Module ID 63105-02
- Trainee S20

**Fasteners** (10 Hours)
- Module ID 63106-02
- Trainee S20

**Piping and Mechanical Blueprint Reading** (15 Hours)
- Module ID 63104-02
- Trainee S20

**Identify Types of Valve Actuators/Operators** (15 Hours)
- Module ID 63108-02
- Trainee S20

**Pipeline Mechanic Hand and Power Tools** (10 Hours)
- Module ID 63103-02
- Trainee S20

**Piping** (15 Hours)
- Module ID 63104-02
- Trainee S20

**Pipeline Maintenance and Mechanical**

**Trainee Guide**:
Installing Seals and Gaskets (10 Hours)
Trainee $20
(Module ID 63109-02) Covers the applications, removal procedures, and installation procedures for dynamic and static seals and O-rings. Also identifies gaskets and gasket materials and explains the procedures for laying out, cutting, and installing gaskets.

Introduction to Pneumatic Systems (10 Hours)
Trainee $20
(Module ID 63201-02) Discusses pneumatic system safety, characteristics of gases and how they are compressed, pneumatic transmission of energy, and compressor operation.

Introduction to Hydraulic Systems (10 Hours)
Trainee $20
(Module ID 63202-02) Discusses hydraulic system safety and the basic principles of hydraulics, including Pascal’s law and Bernoulli’s principle. Explains the function of fluids, parts, pumps, and motors.

Specialty and Precision Tools (15 Hours)
Trainee $20
(Module ID 63203-02) Introduces specialty tools and precision measuring tools and explains how to select, inspect, use, and care for these tools.

Introduction to Metering Devices and Provers (10 Hours)
Trainee $20
ISBN 978-0-13-038357-0
(Module ID 63206-02) Identifies and explains the use of pipeline meters including positive displacement, turbine, ultrasonic, mass-flow, vortex, and orifice. Identifies and explains the use of provers including tank provers, traditional pipe provers, and small volume pipe provers.

Introduction to Pumps (10 Hours)
Trainee $20
(Module ID 63207-02) Identifies main-line and feeder line pumps including centrifugal, rotary, reciprocating, and metering pumps. Explains net positive suction head and cavitation. Outlines general procedures for pump installation.

Introduction to Gas Compressors (10 Hours)
Trainee $20
(Module ID 63208-02) Identifies gas compressors used in the transmission of gas through pipelines. Also explains the function and operation of compressors and identifies the auxiliary equipment used with compressors.

General Maintenance and Winterizing Pipeline Equipment (7.5 Hours)
Trainee $20
(Module ID 63201-02) Explains preventive and predictive maintenance and general maintenance on rotating machinery. Discusses gas compressors and maintaining pumps and prime movers.

VOLUME 2

Tank Repair (40 Hours)
Trainee $20
(Module ID 63207-02) Explains complete tank repair, including flame tightening, nondestructive testing, electrically insulated fittings and flanges, welding, bottom repair, bottom replacement, moving, arc burn and weld repair, roof installation, shell plate replacement, aluminum and steel floating roof demolition, building a floating roof, floating roof in-service seal replacement, and nozzles, manways, and sumps.

Install and Maintain Bearings (15 Hours)
Trainee $20
(Module ID 63209-02) Identifies friction and antifriction bearings, bearing materials, and bearing designation. Gives procedures to remove, troubleshoot, and install bearings.

Install Mechanical Seals (20 Hours)
Trainee $20
(Module ID 63210-02) Explains the function and advantages of mechanical seals. Identifies parts and types of mechanical seals. Includes procedures for removing, inspecting, and installing mechanical seals.

Maintain and Repair Drivers (15 Hours)
Trainee $20
(Module ID 63211-02) Identifies types of drivers that provide power to rotating equipment on pipelines. Explains how to inspect and replace drivers, replace bearings and seals, and perform preventive maintenance.

Install Rotating Equipment (25 Hours)
Trainee $20
ISBN 978-0-13-103178-4
(Module ID 63301-02) Identifies inspection requirements for an equipment pad, requirements for equipment base preparation, and procedures for inspecting equipment prior to installation. Also explains how to prepare equipment prior to installation, the installation process for rotating equipment, and the procedures used to relieve pipe stress from rotating equipment.

Unit Alignment (40 Hours)
Trainee $20
(Module ID 63302-02) Describes types of equipment misalignment and how to identify and correct them. Explains how to perform conventional, rim and face indicator, reverse dial indicator, and laser alignments. Also identifies other laser alignment procedures that may be completed on the machinery trains depending on equipment needs.

Vibration Analysis (5 Hours)
Trainee $20
(Module ID 63303-02) Covers common causes of vibration and how to minimize them. Includes vibration monitoring techniques, vibration analysis techniques, vibration test equipment, and how to field balance machines.

Maintain, Troubleshoot, and Repair Pumps (10 Hours)
Trainee $20
(Module ID 63304-02) Identifies the preventive maintenance requirements, inspection requirements, and common troubleshooting techniques for pumps used in the pipeline industry. Also gives general guidelines for preparing a pump for shutdown, removing a pump from a pipeline system, disassembling a pump, installing the pump after the pump has been reassembled, and preparing the pump for startup and operational check after maintenance or repair has been completed.

Maintain, Troubleshoot, and Repair Gas Compressors (15 Hours)
Trainee $20
(Module ID 63305-02) Identifies the typical lubrication system components, preventive maintenance requirements, and common troubleshooting techniques for a gas compressor. Also gives general guidelines for preparing a gas compressor for shutdown and repair, isolating a gas compressor from a pipeline system, repairing rotary and reciprocating gas compressors, and preparing a gas compressor for startup and operational check after maintenance has been completed.

Maintain, Troubleshoot, and Repair Metering Devices and Provers (20 Hours)
Trainee $20
(Module ID 63309-02) Explains how to inspect, maintain, and repair metering devices and prover systems. Also describes the waterdraw calibration procedures used to calibrate and verify the reliability of prover systems.

L2 PIPELINE MAINTENANCE

Curriculum Notes
- 132.5 Hours
- Revised: 2017, Third Edition
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.
- Available as print on demand
- To purchase individual covered task modules, please visit www.nccer.org/pipeline-program

PAPERSBACK

MODULES
All of the modules listed below are included in the Trainee. Guide The following pricing information is for ordering individual modules which can be purchased through the online bookstore at www.nccer.org/bookstore.

Abnormal Operating Conditions - Control Center (5 Hours)
Trainee $20
ISBN 978-0-13-472782-0
(Module ID AOCCC17)

Abnormal Operating Conditions - Field and Gas (5 Hours)
Trainee $20
ISBN 978-0-13-472784-4
(Module ID AOCFG17)

Visually Inspect Surface Conditions of Right-of-Way (5 Hours)
Trainee $20
(Module ID CT15_1-17)

Inspect Navigable Waterway Crossing (5 Hours)
Trainee $20
(Module ID CT16_1-17)

Routine Inspection of Breakout Tanks (API 653 Monthly or DOT Annual) (7.5 Hours)
Trainee $20
(Module ID CT27_1-17)

Provide Security for Pipeline Facilities (2.5 Hours)
Trainee $20
ISBN 978-0-13-471763-0
(Module ID CT28_0-17)

Observation of Excavation Activities (5 Hours)
Trainee $20
(Module ID CT32_0-17)

Inspect Existing Pipe Following Movement (5 Hours)
Trainee $20
(Module ID CT34_0-17)
Install or Repair Support Structures on Existing Aboveground Components (5 Hours)
(Module ID CT37_0-17)
Trainee $20

Visually Inspect Pipe and Pipe Components Prior to Installation (5 Hours)
(Module ID CT38_0-17)
Trainee $20

Backfilling a Trench Following Maintenance (5 Hours)
(Module ID CT39_0-17)
Trainee $20

Conduct Vegetation Survey (5 Hours)
(Module ID CT52_0-17)
Trainee $20

Conduct a Leak Survey with a CGD (5 Hours)
(Module ID CT52_0-17)
Trainee $20

Conduct a Leak Survey with a Flame Ionization Unit (5 Hours)
(Module ID CT52_3-17)
Trainee $20

Vault Maintenance (10 Hours)
(Module ID CT59_0-17)
Trainee $20

Cold Cutting (10 Hours)
(Module ID CTCC-17)
Trainee $20

Flange Bolting (15 Hours)
(Module ID CTFB-17)
Trainee $20

Mud Plugging (5 Hours)
(Module ID CTMP-17)
Trainee $20
ISBN 978-0-13-471789-0

Tubing (7.5 Hours)
(Module ID CTTB-17)
Trainee $20

Threaded Pipe Fabrication (15 Hours)
(Module ID CTPF-17)
Trainee $20

**L2 PIPELINE MECHANICAL**

**Curriculum Notes**
- Level 2
- 67.5 Hours
- Revised: 2017, Third Edition
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.
- Available as print on demand
- To purchase individual covered task modules, please visit www.nccer.org/pipeline-program

**PAPERBACK**
Trainee Guide: $100

**MODULES**
All of the modules listed below are included in the Trainee Guide. The following pricing information is for ordering individual modules which can be purchased through the online bookstore at www.nccer.org/bookstore.

**Abnormal Operating Conditions - Field and Gas (5 Hours)**
(Module ID AOCFG-17)
Trainee $20
ISBN 978-0-13-472782-0

**Apply Composite Sleeve (10 Hours)**
(Module ID CT40_3-17)
Trainee $20
ISBN 978-0-13-470715-0

**Install Mechanical Bolt-On Split Repair Sleeve (15 Hours)**
(Module ID CT40_4-17)
Trainee $20

**Install Weldable Compression Couplings (5 Hours)**
(Module ID CT40_5-17)
Trainee $20

**Install and Remove Plugging Machine (7.5 Hours)**
(Module ID CT40_6-17)
Trainee $20

**Installing a Tap 2 Inches and Under on a Pipeline System (15 Hours)**
(Module ID CT40_7-17)
Trainee $20

**Installing a Tap Larger Than 2 Inches on a Pipeline (15 Hours)**
(Module ID CT40_8-17)
Trainee $20
ISBN 978-0-13-471002-0

**Install and Remove Completion Plug on Pipelines Larger than 2 Inches (15 Hours)**
(Module ID CT40_9-17)
Trainee $20

**Conduct Pressure Test (15 Hours)**
(Module ID CT41_0-17)
Trainee $20
ISBN 978-0-13-470997-0

**Welding (15 Hours)**
(Module ID CT42_2-17)
Trainee $20

**L3 PIPELINE MAINTENANCE**

**Curriculum Notes**
- Level 3
- 187.5 Hours
- Revised: 2017, Third Edition
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.
- Available as print on demand
- To purchase individual covered task modules, please visit www.nccer.org/pipeline-program

**PAPERBACK**
Trainee Guide: $100

**MODULES**
All of the modules listed below are included in the Trainee Guide. The following pricing information is for ordering individual modules which can be purchased through the online bookstore at www.nccer.org/bookstore.

**Abnormal Operating Conditions - Control Center (5 Hours)**
(Module ID AOCCC-17)
Trainee $20
ISBN 978-0-13-472782-0

**Apply Composite Sleeve (10 Hours)**
(Module ID CT40_3-17)
Trainee $20
ISBN 978-0-13-470715-0

**Fit Full Encirclement Welded Split Sleeve (10 Hours)**
(Module ID CT40_1-17)
Trainee $20

**Purging of Pipeline Facilities (5 Hours)**
(Module ID CT36_2-17)
Trainee $20

**Sealing a Disconnected Portion of Pipeline (5 Hours)**
(Module ID CT36_3-17)
Trainee $20

**Visually Inspect that Welds Meet DOT Requirements (API 1104) (5 Hours)**
(Module ID CT38_3-17)
Trainee $20

**Welding (15 Hours)**
(Module ID CT42_2-17)
Trainee $20

**Revising: 2017, Third Edition**

**To purchase individual covered task modules, please visit www.nccer.org/pipeline-program**

**Stay Connected:**
Facebook: www.nccer.org/instructors
Pipeline Field and Control Center Operations

L1 PIPELINE FIELD AND CONTROL CENTER OPERATIONS

Curriculum Notes

- 115 Hours
- Revised: 2017, Third Edition
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK
Trainee Guide: $100

L3 PIPELINE MECHANICAL

Curriculum Notes

- 80 Hours
- Revised: 2017, Third Edition
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.
- Available as print on demand
- To purchase individual covered task modules, please visit www.nccer.org/pipeline-program

PAPERBACK
Trainee Guide: $100

MODULES

All of the modules listed below are included in the Trainee. The following pricing information is for ordering individual modules which can be purchased through the online bookstore at www.nccer.org/bookstore.

Abnormal Operating Conditions - Field and Gas (5 Hours)
(Module ID AOCFG-17)
Trainee $20
ISBN 978-0-13-472784-4

Inspect Main-Line Valves (7.5 Hours)
(Module ID CT20_0-17)
Trainee $20

Repair Valve Actuator/Operator, Pneumatic (7.5 Hours)
(Module ID CT21_1-17)
Trainee $20
ISBN 978-0-13-470674-0

Disassemble and Reassemble Valves (7.5 Hours)
(Module ID CT21_2-17)
Trainee $20

Internal Inspection of Valves and Their Components (7.5 Hours)
(Module ID CT21_3-17)
Trainee $20

Repair Valve Actuator/Operator, Hydraulic (7.5 Hours)
(Module ID CT21_4-17)
Trainee $20

Repair Valve Actuator/Operator, Electric (7.5 Hours)
(Module ID CT21_5-17)
Trainee $20

Inspect Tank Pressure/Vacuum Breakers (5 Hours)
(Module ID CT22_1-17)
Trainee $20

Inspection, Test, and Calibrate HVL Tank Pressure Relief Valves (5 Hours)
(Module ID CT22_2-17)
Trainee $20

Maintain and Repair Relief Valves (5 Hours)
(Module ID CT23_1-17)
Trainee $20
ISBN 978-0-13-471747-0

Inspect Test, and Calibrate Relief Valves (5 Hours)
(Module ID CT23_2-17)
Trainee $20
ISBN 978-0-13-471750-0

Maintain and Repair Pressure Limiting Devices (5 Hours)
(Module ID CT24_1-17)
Trainee $20

Inspect, Test and Calibrate Pressure Limiting Devices (5 Hours)
(Module ID CT24_2-17)
Trainee $20

Field Quality Control (15 Hours)
Trainee $20

(Module ID 60107-02) Introduces field quality control procedures including activation of tank mixing devices, collection of product samples, product testing, pipeline switching, product blending operations, and injection of appropriate additives.

Field Measurement (20 Hours)
Trainee $20
ISBN 978-0-13-038232-0

(Module ID 60108-02) Introduces techniques used in field measurement of products in the pipeline, including measurement components, types of meters, measurement of custody transfers and receipts, verification of meter accuracy, waterdraw calibration techniques, and utilization of tank strappings.
Pipeline Operations (Control Center/Gas/Liquid) Level 1 (continued)

Liquid Pipeline Measurement and Quality Control (20 Hours)
(Module ID 65107-02) Explains how to calibrate tank mixing devices, perform product testing, and perform pipeline grade changes and tank capacity operations. Also explains how to use and inject appropriate additives, identify types of meters, maintain accurate measurement on all custody receipts, and the processes and techniques used to prove meters.

SCADA (30 Hours)
(Module ID 64307-02) Explains pipeline operations systems, including control, communications, SCADA, and PLCs. Explains redundant systems and control system troubleshooting.

Abnormal Operating Conditions - Field and Gas (5 Hours)
(Module ID AOCFG-17)

Purge Gas from a Pipeline (5 Hours)
(Module ID CT50_0-17)

Purge Air from a Gas Pipeline (5 Hours)
(Module ID CT51_0-17)

Test Remotely Controlled Shutdown Devices (5 Hours)
(Module ID CT54_0-17)

Perform Incremental Pressure Increases to Uprate the MAOP (5 Hours)
(Module ID CT56_0-17)

Operate Odorant Equipment (5 Hours)
(Module ID CT57_0-17)

Monitor Odorant Level (5 Hours)
(Module ID CT58_0-17)

Start-up of a Liquid Pipeline (Field) (5 Hours)
Trainee $20 ISBN 978-0-13-472800-1
(Module ID CT63_1-17)

Shutdown of a Liquid Pipeline (Field) (5 Hours)
(Module ID CT63_2-17)

Monitor Pressures, Flows, Communications, and Line Integrity and Maintain Them Within Allowable Limits on a Liquid Pipeline System (Control Center) (5 Hours)
(Module ID CT64_3-17)

Remote Operator Valves on a Liquid Pipeline System (5 Hours)
(Module ID CT64_4-17)

Start-up of a Gas Pipeline (5 Hours)
(Module ID CT65_2-17)

Shutdown of a Gas Pipeline (5 Hours)
(Module ID CT65_3-17)

Manually or Remotely Open or Close Valves or Other Equipment (5 Hours)
(Module ID CT65_4-17)

Pipeline Corrosion Control

Abnormal Operating Conditions - Field and Gas (5 Hours)
(Module ID AOCFG-17)

Verify Test Lead Continuity (5 Hours)
(Module ID CT2_1-17)

Repair Damaged Test Leads (5 Hours)
(Module ID CT2_2-17)

Install Test Leads by Non-Exothermic Welding Methods (5 Hours)
(Module ID CT2_3-17)

Locally Operate Valves on a Liquid Pipeline System (5 Hours)
(Module ID CT63_4-17)

Start-up of a Liquid Pipeline (Control Center) (5 Hours)
(Module ID CT64_1-17)

Shutdown of a Liquid Pipeline (Control Center) (5 Hours)
(Module ID CT64_2-17)

Monitor Pressures, Flows, Communications, and Line Integrity and Maintain Them Within Allowable Limits on a Liquid Pipeline System (Control Center) (5 Hours)
(Module ID CT64_3-17)

Remote Operate Valves on a Liquid Pipeline System (5 Hours)
(Module ID CT64_4-17)

Start-up of a Gas Pipeline (5 Hours)
(Module ID CT65_1-17)

Shutdown of a Gas Pipeline (5 Hours)
(Module ID CT65_2-17)

Monitor Pressures, Flows, Communications, and Line Integrity and Maintain Them Within Allowable Limits (Gas) (5 Hours)
(Module ID CT65_3-17)

Manually or Remotely Open or Close Valves or Other Equipment (5 Hours)
(Module ID CT65_4-17)
Pipeline Corrosion Control Level 1 (continued)

Install Test Leads by Exothermic Welding
Methods (5 Hours)
(Module ID CT2_4-17) Trainee $20

Obtain a Voltage and Current Output Reading from a Rectifier to Verify Proper Performance (5 Hours)
(Module ID CT3_0-17) Trainee $20

Troubleshoot Rectifier (5 Hours)
(Module ID CT4_1-17) Trainee $20

Repair or Replace Defective Rectifier Components (5 Hours)
(Module ID CT4_2-17) Trainee $20

Adjustment of Rectifier (5 Hours)
(Module ID CT4_3-17) Trainee $20
ISBN 978-0-13-472079-0

Examine for Mechanical Damage on Buried or Submerged Pipe (5 Hours)
(Module ID CT5_1-17) Trainee $20
ISBN 978-0-13-472076-0

Examine for External Corrosion on Buried or Submerged Pipe (5 Hours)
(Module ID CT5_2-17) Trainee $20

Inspect the Condition of External Coating on Buried or Submerged Pipe (5 Hours)
(Module ID CT5_3-17) Trainee $20

Visual Inspection of Atmospheric Coatings (5 Hours)
(Module ID CT7_1-17) Trainee $20

Prepare Surface for Atmospheric Coating Using Hand and Power Tools (5 Hours)
(Module ID CT7_2-17) Trainee $20

Prepare Surface for Coating by Abrasive Water Blasting (5 Hours)
(Module ID CT7_3-17) Trainee $20

Prepare Surface for Coating by Abrasive Blasting Media Other Than Water (5 Hours)
(Module ID CT7_4-17) Trainee $20
ISBN 978-0-13-472063-0

Apply Coating Using Hand Application Methods (5 Hours)
(Module ID CT7_5-17) Trainee $20

Apply Coating Using Spray Application (5 Hours)
(Module ID CT7_6-17) Trainee $20

Perform Coating Inspection (5 Hours)
(Module ID CT7_7-17) Trainee $20

Visually Inspect Internal Pipe Surface (5 Hours)
(Module ID CT12_0-17) Trainee $20

L2 PIPELINE CORROSION CONTROL

Curriculum Notes
- 90 Hours
- Revised: 2017, Third Edition
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.
- Available as print on demand
- To purchase individual covered task modules, please visit www.nccer.org/pipeline-program

MODULES

All of the modules listed below are included in the Trainee Guide. The following pricing information is for ordering individual modules which can be purchased through the online bookstore at www.nccer.org/bookstore.

Abnormal Operating Conditions - Field and Gas (5 Hours)
(Module ID AOFCG-17) Trainee $20
ISBN 978-0-13-472784-4

Measure Structure-to-Soil Potentials (5 Hours)
(Module ID CT1_1-17) Trainee $20

Conduct Close Interval Survey (5 Hours)
(Module ID CT1_2-17) Trainee $20

Test and Detect Interference (5 Hours)
(Module ID CT1_3-17) Trainee $20

Inspect and Perform Electrical Test of Bonds (5 Hours)
(Module ID CT1_4-17) Trainee $20
ISBN 978-0-13-471028-0

Inspect and Test Electrical Isolation (5 Hours)
(Module ID CT1_5-17) Trainee $20

Measure Pit Depth with Pit Gauge (5 Hours)
(Module ID CT1_7-17) Trainee $20

Measure Wall Thickness with Ultrasonic Meter (5 Hours)
(Module ID CT1_8-17) Trainee $20

Measure Corroded Area (5 Hours)
(Module ID CT1_9-17) Trainee $20
ISBN 978-0-13-471044-0

Inspect Shorted Casings (5 Hours)
(Module ID CT9_1-17) Trainee $20

Install Galvanic Anodes (5 Hours)
(Module ID CT9_2-17) Trainee $20

Install Rectifiers (5 Hours)
(Module ID CT9_3-17) Trainee $20
ISBN 978-0-13-471028-0

Install Impressed Current Groundbeds (5 Hours)
(Module ID CT9_4-17) Trainee $20

Repair Shorted Casings (5 Hours)
(Module ID CT9_5-17) Trainee $20

Inspect and Test Electrical Isolation (5 Hours)
(Module ID CT1_5-17) Trainee $20

Insert and Remove Coupons (5 Hours)
(Module ID CT9_6-17) Trainee $20

Monitor Probes (Online) (5 Hours)
(Module ID CT10_1-17) Trainee $20

Monitoring and Controlling the Injection Rate of the Corrosion Inhibitor (5 Hours)
(Module ID CT11_0-17) Trainee $20

PAPERBACK ISBN 978-0-13-471651-0
Trainee Guide: $100

Introduction to the Power Industry

12.5 Hours
Published: 2010
Module ID 49101-10

PAPERBACK ISBN
Trainee Guide: $22 978-0-13-715413-0

- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.
- This module sets the stage for trainees entering the electrical energy production and distribution field. It describes the many ways in which electricity can be produced, from burning fossil fuels such as coal and natural gas, to harnessing nuclear energy, and using renewable energy sources such as wind, geothermal, and solar energy.

Power Generation Maintenance Electrician

L1 POWER GENERATION MAINTENANCE ELECTRICIAN LEVEL 1

Curriculum Notes
- 225 Hours (Includes 100 hours of Power Industry Fundamentals, which is a prerequisite for Level 1 completion and must be purchased separately. See above for more information.)
- Published: 2010
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK ISBN

MODULES
Tools of the Trade (5 Hours)
(Module ID 40102-07; from Industrial Maintenance E&I Technician Level One)

Fasteners and Anchors (5 Hours)
(Module ID 40103-07; from Industrial Maintenance E&I Technician Level One)

Oxyfuel Cutting (17.5 Hours)
(Module ID 40104-07; from Industrial Maintenance E&I Technician Level One)

Gaskets and Packing (10 Hours)
(Module ID 40105-07; from Industrial Maintenance E&I Technician Level One)

Craft-Related Mathematics (15 Hours)
(Module ID 40106-07; from Industrial Maintenance E&I Technician Level One)

Construction Drawings (12.5 Hours)
(Module ID 40107-07; from Industrial Maintenance E&I Technician Level One)

Pumps and Drivers (5 Hours)
(Module ID 40108-07; from Industrial Maintenance E&I Technician Level One)

Valves (5 Hours)
(Module ID 40109-07; from Industrial Maintenance E&I Technician Level One)

Introduction to Test Instruments (7.5 Hours)
(Module ID 40110-07; from Industrial Maintenance E&I Technician Level One)

Material Handling and Hand Rigging (15 Hours)
(Module ID 40111-07; from Industrial Maintenance E&I Technician Level One)

Mobile and Support Equipment (10 Hours)
(Module ID 40112-07; from Industrial Maintenance E&I Technician Level One)
Trainee S20 ISBN 978-0-13-614623-0

Lubrication (12.5 Hours)
(Module ID 40113-07; from Industrial Maintenance E&I Technician Level One)

SMAW Equipment and Setup (5 Hours)
(Module ID 29107-09; from Welding Level One, Fourth Edition)

L2 POWER GENERATION MAINTENANCE ELECTRICIAN LEVEL 2

Curriculum Notes
- 167.5 Hours
- Published: 2010
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK ISBN
Trainee Guide: $97 978-0-13-215423-9

MODULES
Tools of the Trade (5 Hours)
(Module ID 40102-07; from Industrial Maintenance E&I Technician Level One)

Fasteners and Anchors (5 Hours)
(Module ID 40103-07; from Industrial Maintenance E&I Technician Level One)

Oxyfuel Cutting (17.5 Hours)
(Module ID 40104-07; from Industrial Maintenance E&I Technician Level One)

Gaskets and Packing (10 Hours)
(Module ID 40105-07; from Industrial Maintenance E&I Technician Level One)

Craft-Related Mathematics (15 Hours)
(Module ID 40106-07; from Industrial Maintenance E&I Technician Level One)

Construction Drawings (12.5 Hours)
(Module ID 40107-07; from Industrial Maintenance E&I Technician Level One)

Pumps and Drivers (5 Hours)
(Module ID 40108-07; from Industrial Maintenance E&I Technician Level One)

Valves (5 Hours)
(Module ID 40109-07; from Industrial Maintenance E&I Technician Level One)

Introduction to Test Instruments (7.5 Hours)
(Module ID 40110-07; from Industrial Maintenance E&I Technician Level One)

Material Handling and Hand Rigging (15 Hours)
(Module ID 40111-07; from Industrial Maintenance E&I Technician Level One)

Mobile and Support Equipment (10 Hours)
(Module ID 40112-07; from Industrial Maintenance E&I Technician Level One)
Trainee S20 ISBN 978-0-13-614623-0

Lubrication (12.5 Hours)
(Module ID 40113-07; from Industrial Maintenance E&I Technician Level One)

SMAW Equipment and Setup (5 Hours)
(Module ID 29107-09; from Welding Level One, Fourth Edition)
Power Generation Maintenance Electrician Level 2 (continued)

**MODULES**

**Industrial Safety for E&I Technicians**
(12.5 Hours)
(Module ID 40201-08; from Industrial Maintenance E&I Technician Level Two)
Trainee $20

**Managing Electrical Hazards**
(12.5 Hours)
(Module ID 26301-09; from Electrical, First Edition)
Trainee $22

**Introduction to the National Electrical Code®**
(5 Hours)
(Module ID 40202-08; from Industrial Maintenance E&I Technician Level Two)
Trainee $20

**Electrical Theory**
(15 Hours)
(Module ID 40203-08; from Industrial Maintenance E&I Technician Level Two)
Trainee $20

**Alternating Current**
(20 Hours)
(Module ID 40204-08; from Industrial Maintenance E&I Technician Level Two)
Trainee $20

**E&I Drawings**
(10 Hours)
(Module ID 40303-09; from Industrial Maintenance E&I Technician Level Three)
Trainee $20

**E&I Test Equipment**
(10 Hours)
(Module ID 40205-08; from Industrial Maintenance E&I Technician Level Two)
Trainee $20

**Conductors and Cables**
(10 Hours)
(Module ID 40212-08; from Industrial Maintenance E&I Technician Level Two)
Trainee $20

**Conductor Terminations and Splices**
(10 Hours)
(Module ID 40213-08; from Industrial Maintenance E&I Technician Level Two)
Trainee $20

**Motor Controls**
(15 Hours)
(Module ID 40304-09; from Industrial Maintenance E&I Technician Level Three)
Trainee $20

**Hydraulic Controls**
(15 Hours)
(Module ID 40311-09; from Industrial Maintenance E&I Technician Level Three)
Trainee $20

**Pneumatic Controls**
(15 Hours)
(Module ID 40312-09; from Industrial Maintenance E&I Technician Level Three)
Trainee $20
ISBN 978-0-13-604739-1

**Programmable Logic Controllers**
(17.5 Hours)
(Module ID 40409-09; from Industrial Maintenance E&I Technician Level Four)
Trainee $20

---

**L3 POWER GENERATION MAINTENANCE ELECTRICIAN**

**LEVEL 3**

**Curriculum Notes**
- 225.5 Hours
- Published: 2010
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

**PAPERBACK**
Trainee Guide: $97

---

**MODULES**

**Conductor Installations**
(10 Hours)
(Module ID 26206-08; from Electrical Level Two, Sixth Edition)
Trainee $20

**Cable Tray**
(7.5 Hours)
(Module ID 26207-08; from Electrical Level Two, Sixth Edition)
Trainee $20

**Grounding and Bonding**
(15 Hours)
(Module ID 26209-08; from Electrical Level Two, Sixth Edition)
Trainee $20

**Machine Bending of Conduit**
(15 Hours)
(Module ID 40301-09; from Industrial Maintenance E&I Technician Level Three)
Trainee $20

**Electric Lighting**
(15 Hours)
(Module ID 26203-08; from Electrical Level Two, Sixth Edition)
Trainee $20

**Practical Applications of Lighting**
(12.5 Hours)
(Module ID 26303-08; from Electrical Level Three, Sixth Edition)
Trainee $20

**Hazardous Locations**
(10 Hours)
(Module ID 40310-09; from Industrial Maintenance E&I Technician Level Three)
Trainee $20

**Circuit Breakers and Fuses**
(12.5 Hours)
(Module ID 26210-08; from Electrical Level Two, Sixth Edition)
Trainee $20

**Transformer Applications**
(7.5 Hours)
(Module ID 40306-09; from Industrial Maintenance E&I Technician Level Three)
Trainee $20

**Distribution Equipment**
(17.5 Hours)
(Module ID 40305-09; from Industrial Maintenance E&I Technician Level Three)
Trainee $20

---

**Power Plant Electrical Systems**
(12.5 Hours)
Trainee $18
(Module ID 50301-11) Describes how the electrical power to operate a power station is developed and distributed in normal, shutdown, and emergency situations. Covers equipment used in power stations, including circuit breakers, switchgear, and motor control centers.

**Conductor Selection and Calculations**
(15 Hours)
(Module ID 40307-09; from Industrial Maintenance E&I Technician Level Three)
Trainee $20

**Motors: Theory and Application**
(20 Hours)
(Module ID 26202-08; from Electrical Level Two, Sixth Edition)
Trainee $20

**Motor-Operated Valves**
(15 Hours)
(Module ID 40313-09; from Industrial Maintenance E&I Technician Level Three)
Trainee $20

**Control Systems and Fundamental Concepts**
(12.5 Hours)
(Module ID 26211-08; from Electrical Level Two, Sixth Edition)
Trainee $20

**Temporary Grounding**
(15 Hours)
(Module ID 40308-09; from Industrial Maintenance E&I Technician Level Three)
Trainee $20
ISBN 978-0-13-604738-4

---

**L4 POWER GENERATION MAINTENANCE ELECTRICIAN**

**LEVEL 4**

**Curriculum Notes**
- 197.5 Hours
- Published: 2011
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

**PAPERBACK**
Trainee Guide: $97

---

**MODULES**

**Load Calculations – Branch and Feeder Circuits**
(17.5 Hours)
(Module ID 26301-08; from Electrical Level Three, Sixth Edition)
Trainee $20

**Motor Calculations**
(12.5 Hours)
(Module ID 26309-08; from Electrical Level Three, Sixth Edition)
Trainee $20

**Overcurrent Protection**
(25 Hours)
(Module ID 26305-08; from Electrical Level Three, Sixth Edition)
Trainee $20
ISBN 978-0-13-609294-0

**Specialty Transformers**
(10 Hours)
(Module ID 26406-08; from Electrical Level Four, Sixth Edition)
Trainee $20
ISBN 978-0-13-609319-0

**Advanced Controls**
(20 Hours)
(Module ID 26407-08; from Electrical Level Four, Sixth Edition)
Trainee $20
Power Generation Maintenance Electrician Level 3 (continued)

Motor Operation and Maintenance (10 Hours)
(Module ID 26410-08; from Electrical Level Four, Sixth Edition)
Trainee $20

Generator Maintenance (20 Hours)
Trainee $20
(Module ID 50401-10) Covers the operating characteristics and major components of AC and DC generators. Topics include generator connection methods; voltage regulators; auxiliary systems; and maintenance procedures.

Switchgear and Breaker Maintenance (25 Hours)
Trainee $20
(Module ID 50402-11) Reviews the safety practices associated with power station electrical work. Explains how medium-voltage and low-voltage sources are developed and used in the power station, and how the station power system functions in a blackout or shutdown situation. Also describes the circuit breakers, switchgear, and motor control centers used in power stations, and provides instructions for maintenance of these devices.

Preventive and Predictive Maintenance
(10 Hours)
Trainee $20
(Module ID 32401-09; from Industrial Maintenance Mechanic Level Four)

Medium Voltage Terminations/Splices
(10 Hours)
Trainee $20
(Module ID 26411-08; from Electrical Level Four, Sixth Edition)

Fire Alarm Systems (15 Hours)
Trainee $20
(Module ID 26405-08; from Electrical Level Four, Sixth Edition)

Heat Tracing and Freeze Protection (10 Hours)
Trainee $20
(Module ID 26409-08; from Electrical Level Four, Sixth Edition)

Standby and Emergency Systems (12.5 Hours)
Trainee $20
(Module ID 40401-09; from Industrial Maintenance E&I Technician Level Four)

Power Generation I&C Maintenance Technician

L1  POWER GENERATION I&C MAINTENANCE TECHNICIAN

CURRICULUM NOTES

• 225 Hours (Includes 100 hours of Power Industry Fundamentals, which is a prerequisite for Level 1 completion and must be purchased separately. See p. 82 for more information.)
• Published: 2010
• Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK
Trainee Guide: $67

MODULES

Tools of the Trade (5 Hours)
(Module ID 40102-07; from Industrial Maintenance E&I Technician Level One)
Trainee $20

Fasteners and Anchors (5 Hours)
(Module ID 40103-07; from Industrial Maintenance E&I Technician Level One)
Trainee $20

Oxyfuel Cutting (17.5 Hours)
(Module ID 40104-07; from Industrial Maintenance E&I Technician Level One)
Trainee $20

Gaskets and Packing (10 Hours)
(Module ID 40105-07; from Industrial Maintenance E&I Technician Level One)
Trainee $20

Craft-Related Mathematics (15 Hours)
(Module ID 40106-07; from Industrial Maintenance E&I Technician Level One)
Trainee $20

Construction Drawings (12.5 Hours)
(Module ID 40107-07; from Industrial Maintenance E&I Technician Level One)
Trainee $20

Pumps and Drivers (5 Hours)
(Module ID 40108-07; from Industrial Maintenance E&I Technician Level One)
Trainee $20

Valves (5 Hours)
(Module ID 40109-07; from Industrial Maintenance E&I Technician Level One)
Trainee $20

Introduction to Test Instruments (7.5 Hours)
(Module ID 40110-07; from Industrial Maintenance E&I Technician Level One)
Trainee $20

Material Handling and Hand Rigging (15 Hours)
(Module ID 40111-07; from Industrial Maintenance E&I Technician Level One)
Trainee $20

Mobile and Support Equipment (10 Hours)
(Module ID 40112-07; from Industrial Maintenance E&I Technician Level One)
Trainee $20
ISBN 978-0-13-614623-0

Maintenance (12.5 Hours)
(Module ID 40113-07; from Industrial Maintenance E&I Technician Level One)
Trainee $20

SMAW Equipment and Setup (5 Hours)
(Module ID 29107-09; from Welding Level One, Fourth Edition)
Trainee $20

L2  POWER GENERATION I&C MAINTENANCE TECHNICIAN

CURRICULUM NOTES

• 167.5 Hours
• Published: 2010
• Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK
Trainee Guide: $97

MODULES

Industrial Safety for E&I Technicians
(12.5 Hours)
(Module ID 40201-08; from Industrial Maintenance E&I Technician Level Two)
Trainee $20

Managing Electrical Hazards
(12.5 Hours)
(Module ID 26501-09; from Electrical, First Edition)
Trainee $20

Introduction to the National Electrical Code®
(5 Hours)
(Module ID 40202-08; from Industrial Maintenance E&I Technician Level Two)
Trainee $20

Electrical Theory (15 Hours)
(Module ID 40203-08; from Industrial Maintenance E&I Technician Level Two)
Trainee $20

Alternating Current (20 Hours)
(Module ID 40204-08; from Industrial Maintenance E&I Technician Level Two)
Trainee $20
Flow, Pressure, Level and Temperature
(15 Hours)
(Module ID 40206-08; from Industrial Maintenance E&I Technician Level Two)
Trainee S20

Instrument Drawings and Documents,
Part One (15 Hours)
(Module ID 40211-08; from Industrial Maintenance E&I Technician Level Two)
Trainee S20

Electrical Systems for Instrumentation
(22.5 Hours)
(Module ID 12104-01; from Instrumentation Level One, Second Edition)
Trainee S20

Relays and Timers (7.5 Hours)
(Module ID 12208-03; from Instrumentation Level Two, Second Edition)
Trainee S20

Switches and Photoelectric Devices (5 Hours)
(Module ID 12209-03; from Instrumentation Level Two, Second Edition)
Trainee S20

Tubing (15 Hours)
(Module ID 40209-08; from Industrial Maintenance E&I Technician Level Two)
Trainee S20
ISBN 978-0-13-604710-0

Clean, Purge, and Test Tubing and Piping Systems
(7.5 Hours)
(Module ID 40210-08; from Industrial Maintenance E&I Technician Level Two)
Trainee S20

Layout and Installation of Tubing and Piping Systems
(22.5 Hours)
(Module ID 40309-09; from Industrial Maintenance E&I Technician Level Three)
Trainee S20

Electronic Components (10 Hours)
(Module ID 40302-09; from Industrial Maintenance E&I Technician Level Three)
Trainee S20

Panel-Mounted Instruments (7.5 Hours)
(Module ID 12212-03; from Instrumentation Level Two, Second Edition)
Trainee S20

Installing Field-Mounted Instruments (25 Hours)
(Module ID 12213-03; from Instrumentation Level Two, Second Edition)
Trainee S20

Grounding and Shielding of Instrumentation Wiring
(10 Hours)
(Module ID 12306-03; from Instrumentation Level Three, Second Edition)
Trainee S20

Analyzers (20 Hours)
(Module ID 12408-03; from Instrumentation Level Four, Second Edition)
Trainee S20

L4 POWER GENERATION I&C
MAINTENANCE TECHNICIAN
LEVEL 4

Curriculum Notes
• 210 Hours
• Published: 2010
• downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK

MODULES
Standby and Emergency Systems (12.5 Hours)
(Module ID 40401-09; from Industrial Maintenance E&I Technician Level Four)
Trainee S20

Basic Process Control Elements, Transducers and Transmitters (15 Hours)
(Module ID 40402-09; from Industrial Maintenance E&I Technician Level Four)
Trainee S20

Instrument Calibration and Configuration (10 Hours)
(Module ID 40403-09; from Industrial Maintenance E&I Technician Level Four)
Trainee S20

Pneumatic Control Valves, Actuators and Positioners (40 Hours)
(Module ID 40404-09; from Industrial Maintenance E&I Technician Level Four)
Trainee S20

Performing Loop Checks (7.5 Hours)
(Module ID 40405-09; from Industrial Maintenance E&I Technician Level Four)
Trainee S20

Troubleshooting and Commissioning a Loop (10 Hours)
(Module ID 40406-09; from Industrial Maintenance E&I Technician Level Four)
Trainee S20

Process Control Theory (20 Hours)
(Module ID 12204-03; from Instrumentation Level Two, Second Edition)
Trainee S20

Process Control Loops and Tuning (20 Hours)
(Module ID 40407-09; from Industrial Maintenance E&I Technician Level Four)
Trainee S20

Data Networks (15 Hours)
(Module ID 40408-09; from Industrial Maintenance E&I Technician Level Four)
Trainee S20

Digital Logic Circuits (10 Hours)
(Module ID 12401-03; from Instrumentation Level Four, Second Edition)
Trainee S20

PAPERBACK

MODULES
Instrumentation Electrical Circuitry (25 Hours)
(Module ID 12305-03; from Instrumentation Level Three, Second Edition)
Trainee S20

Process Mathematics (15 Hours)
(Module ID 40207-08; from Industrial Maintenance E&I Technician Level Two)
Trainee S20

To Order Call: 1-800-922-0579
Stay Connected: www.nccer.org/instructors 85
Calibrate Supervisory Instrumentation
Elements (10 Hours)
Trainee $20
(Module ID 51401-10) Describes the sensing devices used to monitor key parameters, including vibration and speed sensors, eccentricity sensors, and thrust bearing wear detectors. Also covers the test instruments used to calibrate supervisory instrumentation, including shakers and Wobulators®, and explains how to use selected test instruments in the calibration process.

Boiler/HRSG Control (12.5 Hours)
Trainee $20
(Module ID 51402-10) Covers the control devices, methods, and strategies used for boilers and Heat Recovery Steam Generators (HRSGs). Discusses fuel, air, oxygen, feedwater, and steam control, as well as the precautions and regulations related to burner and furnace fuel control.

Preventive and Predictive Maintenance
(10 Hours)
Trainee $20
(Module ID 32401-09; from Industrial Maintenance Mechanic
Level Four)

Distributed Control Systems (17.5 Hours)
Trainee $20
ISBN 978-0-13-609137-0
(Module ID 40410-09; from Industrial Maintenance E&I
Technician Level Four)

Power Generation Maintenance Mechanic

L1 POWER GENERATION MAINTENANCE MECHANIC

LEVEL 1

Construction Drawings (12.5 Hours)
Trainee $20
ISBN 978-0-13-614582-0
(Module ID 32107-07; from Industrial Maintenance Mechanic
Level One)

Pumps and Drivers (5 Hours)
Trainee $20
(Module ID 32108-07; from Industrial Maintenance Mechanic
Level One)

Valves (5 Hours)
Trainee $20
(Module ID 32109-07; from Industrial Maintenance Mechanic
Level One)

Introduction to Test Instruments (2.5 Hours)
Trainee $20
(Module ID 32110-07; from Industrial Maintenance Mechanic
Level One)

Material Handling and Hand Rigging (15 Hours)
Trainee $20
(Module ID 32111-07; from Industrial Maintenance Mechanic
Level One)

Mobile and Support Equipment (10 Hours)
Trainee $20
(Module ID 32112-07; from Industrial Maintenance Mechanic
Level One)

Lubrication (12.5 Hours)
Trainee $20
(Module ID 32113-07; from Industrial Maintenance Mechanic
Level One)

SMAW Equipment and Setup (5 Hours)
Trainee $20
(Module ID 29107-07; from Industrial Maintenance Mechanic
Level One)

L2 POWER GENERATION MAINTENANCE MECHANIC

LEVEL 2

Curriculum Notes

• 225 Hours (Includes 100 hours of Power Industry Fundamentals, which is a prerequisite for Level 1 completion and must be purchased separately. See p. 82 for more information.)
• Published: 2010
• Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK ISBN

MODULES

Tools of the Trade (5 Hours)
Trainee $20
ISBN 978-0-13-614584-4
(Module ID 32102-07; from Industrial Maintenance Mechanic
Level One)

Fasteners and Anchors (5 Hours)
Trainee $20
(Module ID 32103-07; from Industrial Maintenance Mechanic
Level One)

Oxyfuel Cutting (17.5 Hours)
Trainee $20
(Module ID 32104-07; from Industrial Maintenance Mechanic
Level One)

Gaskets and Packing (10 Hours)
Trainee $20
(Module ID 32105-07; from Industrial Maintenance Mechanic
Level One)

Craft-Related Mathematics (15 Hours)
Trainee $20
(Module ID 32106-07; from Industrial Maintenance Mechanic
Level One)

MODULES

Basic Layout (20 Hours)
Trainee $20
(Module ID 32304-08; from Industrial Maintenance Mechanic
Level Three)

Installing Mechanical Seals (20 Hours)
Trainee $20
(Module ID 32308-08; from Industrial Maintenance Mechanic
Level Three)

Conventional Alignment (30 Hours)
Trainee $20
(Module ID 32306-08; from Industrial Maintenance Mechanic
Level Three)

Reverse Alignment (30 Hours)
Trainee $20
(Module ID 32404-09; from Industrial Maintenance Mechanic
Level Four)

Laser Alignment (25 Hours)
Trainee $20
ISBN 978-0-13-60449-0
(Module ID 32405-09; from Industrial Maintenance Mechanic
Level Four)
Power Generation Maintenance Mechanic Level 2 (continued)

Installing Belt and Chain Drives (10 Hours)
(Module ID 32307-08; from Industrial Maintenance Mechanic Level Three)
Trainee $20

Introduction to Piping Components (5 Hours)
(Module ID 32202-07; from Industrial Maintenance Mechanic Level Two)
Trainee $20

Copper and Plastic Piping Practices (5 Hours)
(Module ID 32203-07; from Industrial Maintenance Mechanic Level Two)
Trainee $20

Hydrostatic and Pneumatic Testing (10 Hours)
(Module ID 32206-07; from Industrial Maintenance Mechanic Level Two)
Trainee $20

Installing Fans and Blowers (10 Hours)
(Module ID 15312-08; from Millwright Level Three)
Trainee $20

Conveyors (5 Hours)
(Module ID 15401-08; from Millwright Level Four)
Trainee $20

Troubleshooting and Repairing Conveyors (12.5 Hours)
(Module ID 15402-08; from Millwright Level Four)
Trainee $20

Basic Hydraulic Systems (10 Hours)
(Module ID 15409-08; from Millwright Level Four)
Trainee $20

Troubleshooting and Repairing Hydraulic Equipment (7.5 Hours)
(Module ID 15410-08; from Millwright Level Four)
Trainee $20

Motor-Operated Valves (15 Hours)
(Module ID 40313-08; from Industrial Maintenance E&I Technician Level Three)
Trainee $20

Advanced Blueprint Reading (25 Hours)
(Module ID 32402-09; from Industrial Maintenance Mechanic Level Four)
Trainee $20

Preventive and Predictive Maintenance (10 Hours)
(Module ID 32401-09; from Industrial Maintenance Mechanic Level Four)
Trainee $20

Fuel Preparation and Delivery Equipment (25 Hours)
(Module ID 52402-10) Explains the basic operations of a coal-fired boiler system. Describes the delivery processes from the storage yard into the coal preparation equipment, and from the equipment into the furnace. Addresses the maintenance checks that need to be made on coal delivery and preparation equipment and explains how solid fuel wastes are disposed of in coal-burning furnace systems. Describes how other solid-fuel furnaces, such as biomass furnaces, are used with boilers.
Trainee $20

Introduction to Tube Work (10 Hours)
(Module ID 32212-07; from Industrial Maintenance Mechanic Level Two)
Trainee $20

Compressors and Pneumatic Systems (35 Hours)
(Module ID 32403-09; from Industrial Maintenance Mechanic Level Four)
Trainee $20

Troubleshooting and Repairing Pumps (10 Hours)
(Module ID 32407-09; from Industrial Maintenance Mechanic Level Four)
Trainee $20
ISBN 978-0-13-610452-0

Troubleshooting and Repairing Gearboxes (20 Hours)
(Module ID 32408-09; from Industrial Maintenance Mechanic Level Four)
Trainee $20

Setting Baseplates and Prealignment (30 Hours)
(Module ID 32305-08; from Industrial Maintenance Mechanic Level Three)
Trainee $20

Turbines (20 Hours)
(Module ID 15505-09; from Millwright Level Five)
Trainee $20
ISBN 978-0-13-610496-4

Maintaining and Repairing Turbine Components (15 Hours)
(Module ID 15506-09; from Millwright Level Five)
Trainee $20

Troubleshooting and Repairing Pumps (10 Hours)
(Module ID 32407-09; from Industrial Maintenance Mechanic Level Four)
Trainee $20
ISBN 978-0-13-610452-0

To Order Call: 1-800-922-0579
To address the need for one standardized and nationally recognized Power Line Worker curriculum, NCCER has developed Power Line Worker Level One. Common to transmission, distribution, and substation, Power Line Worker Level One addresses the fundamental aspects of power line work to include safety, electrical theory, climbing techniques, aerial framing and rigging, and operating utility service equipment. After Level One, the training program diverges into the three specialty areas (transmission, distribution, and substation) for two additional years of skills training.

Tools of the Trade (10 Hours)
Trainee $20
Trainee Guide: $67
(Module ID 49107-11) Covers the specialized tools used by line workers, including hot sticks, as well as universal tool accessories. Also covers ladders and work platforms; crampers; cable cutters; pneumatic tools; and powder-actuated tools.

Aerial Framing and Associated Hardware (80 Hours)
Trainee $20
Trainee Guide: $97
(Module ID 49108-11) Explains how to install guys to support a utility pole, as well as how to install the equipment on the pole to support conductors. Includes procedures for the installation of cross-arms, transformers, and conductors.

Utility Service Equipment (15 Hours)
Trainee $20
Trainee Guide: $67
(Module ID 49110-11) Provides descriptions and operations instructions for use of the digger derrick, bucket truck, crane truck, and aerial lift. Also covers safety requirements; inspection and maintenance; driving and setup operations; and emergency procedures.

Rigging (12.5 Hours)
Trainee $20
Trainee Guide: $67
(Module ID 49111-11) Provides instructions for the storage, loading, and transport of wooden utility poles. Includes use of the digger derrick to dig the hole and install the pole. Also covers pole removal using a hydraulic jacking device.

Trenching, Excavating, and Boring Equipment (7.5 Hours)
Trainee $20
Trainee Guide: $67
(Module ID 49112-11) Covers the use and maintenance of trenching equipment, backhoe/loaders, and horizontal directional drilling equipment for the installation of direct-buried power lines. Includes a review of safety guidelines related to buried utilities.

Introduction to Electrical Test Equipment (7.5 Hours)
Trainee $20
Trainee Guide: $67
ISBN 978-0-13-266338-0
(Module ID 49113-11) Introduces the basic test equipment used by electrical workers to test and troubleshoot electrical circuits. Also covers specialized line worker test equipment, including the high-voltage detector, phase rotation tester, megohmmeter, phasing stick, and hi-pot tester.

To Order Call: 1-800-922-0579
Stay Connected: www.nccer.org/instructors

POWER LINE WORKER
LEVEL 1

MODULES
All of the modules below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

Power Line Worker Safety (22.5 Hours)
Trainee $20
(Module ID 49102-11) Covers the safety equipment and safety practices associated with the special hazards of power line work, including electrical and arc flash hazards; traffic control; trenching; horizontal directional drilling; working in confined spaces; and safe entry into a substation.

Introduction to Electrical Circuits (7.5 Hours)
Trainee $20
(Module ID 49103-11) Provides a general introduction to electricity and DC circuits, including theory of voltage, current and resistance, basic DC circuits, and Ohm’s law. Also introduces the test equipment used in power line work.

Introduction to Electrical Theory (7.5 Hours)
Trainee $20
(Module ID 49104-11) Describes how to calculate voltage, current, and resistance values in series, parallel, and combination DC circuits using Ohm’s law. Also includes a basic description of grounding and bonding.

Climbing Wooden Poles (80 Hours)
Trainee $20
(Module ID 49105-11) Describes how to safely climb a wooden utility pole. Covers climbing equipment, inspection of equipment, pole inspection, climbing techniques, and pole-top rescue.

Climbing Structures Other Than Wood (40 Hours)
Trainee $20
(Module ID 49106-11) Explains the equipment, safety practices, and climbing techniques required to climb towers. Hazards associated with the environment, such as snakes, birds, insects, and weather hazards, are also covered.

To address the need for one standardized and nationally recognized Power Line Worker curriculum, NCCER has developed Power Line Worker Level One. Common to transmission, distribution, and substation, Power Line Worker Level One addresses the fundamental aspects of power line work to include safety, electrical theory, climbing techniques, aerial framing and rigging, and operating utility service equipment. After Level One, the training program diverges into the three specialty areas (transmission, distribution, and substation) for two additional years of skills training.

Tools of the Trade (10 Hours)
Trainee $20
Trainee Guide: $67
(Module ID 49107-11) Covers the specialized tools used by line workers, including hot sticks, as well as universal tool accessories. Also covers ladders and work platforms; crampers; cable cutters; pneumatic tools; and powder-actuated tools.

Aerial Framing and Associated Hardware (80 Hours)
Trainee $20
Trainee Guide: $97
(Module ID 49108-11) Explains how to install guys to support a utility pole, as well as how to install the equipment on the pole to support conductors. Includes procedures for the installation of cross-arms, transformers, and conductors.

Utility Service Equipment (15 Hours)
Trainee $20
Trainee Guide: $67
(Module ID 49110-11) Provides descriptions and operations instructions for use of the digger derrick, bucket truck, crane truck, and aerial lift. Also covers safety requirements; inspection and maintenance; driving and setup operations; and emergency procedures.

Rigging (12.5 Hours)
Trainee $20
Trainee Guide: $67
(Module ID 49111-11) Provides instructions for the storage, loading, and transport of wooden utility poles. Includes use of the digger derrick to dig the hole and install the pole. Also covers pole removal using a hydraulic jacking device.

Trenching, Excavating, and Boring Equipment (7.5 Hours)
Trainee $20
Trainee Guide: $67
(Module ID 49112-11) Covers the use and maintenance of trenching equipment, backhoe/loaders, and horizontal directional drilling equipment for the installation of direct-buried power lines. Includes a review of safety guidelines related to buried utilities.

Introduction to Electrical Test Equipment (7.5 Hours)
Trainee $20
Trainee Guide: $67
ISBN 978-0-13-266338-0
(Module ID 49113-11) Introduces the basic test equipment used by electrical workers to test and troubleshoot electrical circuits. Also covers specialized line worker test equipment, including the high-voltage detector, phase rotation tester, megohmmeter, phasing stick, and hi-pot tester.

To Order Call: 1-800-922-0579
Stay Connected: www.nccer.org/instructors

POWER LINE WORKER: DISTRIBUTION
LEVEL 2

MODULES
All of the modules below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

Alternating Current and Three-Phase Systems (17.5 Hours)
Trainee $20
(Module ID 80201-11) Introduces the development of both single- and three-phase alternating current. Analyzes the relationship of AC phases and introduces key components used to refine AC power. Discusses the operation of transformers and introduces advanced AC concepts such as reactive power and the power factor.

Aerial Distribution Equipment (25 Hours)
Trainee $20
(Module ID 80202-11) Identifies the various equipment components found on overhead distribution system poles and describes the function of each, including transformers, reclosers, fuses, sectionalizers, capacitor banks, and voltage regulators.

Cable and Conductor Installation and Removal (20 Hours)
Trainee $20
ISBN 978-0-13-274261-0
(Module ID 80203-11) Describes the types of conductors and cables used in overhead and underground residential distribution systems and the equipment and procedures used to install and remove them. Includes methods used to splice conductors.

Underground Residential Distribution (URD) Systems (30 Hours)
Trainee $20
(Module ID 80204-11) Describes the methods used to distribute power in residential and commercial subdivisions, including the equipment used in the process, such as pad-mount transformers and switchgear. Covers the components and methods used to connect primary and secondary power, as well as the protective devices used in URD systems and methods used to locate and repair buried cables.
Power Line Worker: Distribution Level 2 (continued)

**Overhead and URD Service Installations** (15 Hours)
Trainee $20
(Module ID 80205-11) Describes the methods and procedures used in terminating single-phase and three-phase aerial and URD systems at residential and commercial customer locations. Includes coverage of revenue meters and street light connections.

**Distribution Line Maintenance** (50 Hours)
Trainee $20
(Module ID 80206-11) Describes the inspection process and the methods and procedures used to inspect and maintain poles, conductors, and equipment used in aerial and URD systems. Includes coverage of transformer testing; location and correction of faults in URD systems; load management systems; and protective device coordination.

**Troubleshooting** (40 Hours)
Trainee $20
(Module ID 80304-12) Focuses on the methods used to safely locate and correct faults in aerial and URD systems. Includes troubleshooting methods as well as work site preparation.

**Introduction to Smart Grids** (2.5 Hours)
Trainee $20
(Module ID 80305-12) Describes the network of transmission and distribution lines that delivers electricity between generating sources and consumers, and explains how the smart grid overlays this network to maintain a balance between power availability and demand.

**Fundamentals of Crew Leadership** (20 Hours)
Trainee $20
(Module ID 46101-11, Second Edition) Covers basic leadership skills and explains different leadership styles, communication, delegating, and problem solving. Jobsite safety and the crew leader's role in safety are discussed, as well as project planning, scheduling, and estimating. Includes performance tasks to assist the learning process.

**Conductors and Cables** (10 Hours)
Trainee $20
(Module ID 82202-12) Identifies the many types, sizes, and applications of conductors and cables. Fiber-optic cable is also introduced. Reviews the use of cable drawings and schedules. Provides coverage of the methods of routing cables underground in the substation environment.

**Cable Tray** (7.5 Hours)
Trainee $20
(Module ID 26207-11; from Electrical Level Two, Seventh Edition)

**Conduit Bending** (15 Hours)
Trainee $20
(Module ID 26204-11; from Electrical Level Two, Seventh Edition)

**Conductor Installations** (10 Hours)
Trainee $20
(Module ID 26206-11; from Electrical Level Two, Seventh Edition)

**Conductor Terminations and Splicing** (7.5 Hours)
Trainee $20
(Module ID 26208-11; from Electrical Level Two, Seventh Edition)

**Grounding Systems** (12.5 Hours)
Trainee $20
(Module ID 82203-12) Describes the purpose and arrangement of grounding systems installed beneath a substation. Covers the materials of construction and the approaches to reliable ground system connections. Introduces safety concerns and precautions associated with substation and grounding grid expansion.

**Grades** (15 Hours)
Trainee $20
(Module ID 22106-12; from Heavy Equipment Operations Level One)

**Concrete Work** (35 Hours)
Trainee $20
(Module ID 82204-12) Provides comprehensive coverage of concrete pouring and finishing techniques. Includes detailed information on concrete types and their uses. Form layout and construction, along with basic surveying skills, is presented. Also provides detailed coverage of rebar types and their common geometric forms.

**Mechanical Construction Methods and Materials** (17.5 Hours)
Trainee $20
(Module ID 82205-12) Covers the diverse types of substation structures and their composition. Identifies components commonly supported by structures and the various bus forms and materials of construction. Includes thorough coverage of threaded fasteners along with mechanical torquing tools and procedures.

**Intermediate Rigging** (10 Hours)
Trainee $20
(Module ID 38201-11; from Intermediate Rigger, Second Edition)

---

**To Order Call:** 1-800-922-0579

**Stay Connected:**

www.nccer.org/instructors

---

**Power Line Worker: Substation**

---

**Conductor Installations**
Trainee $20
(Module ID 46101-11, Second Edition) Provides an overview of monitoring and protection systems and reviews the key components that make them work. Describes feeder diagrams and their use in locating and identifying components.

**Altering Current and Three-Phase Systems** (17.5 Hours)
Trainee $20
(Module ID 80201-12; from Power Line Worker: Substation Level Two)

---

**Overhead and URD Service Installations**
Trainee $20
(Module ID 80205-11) Describes the methods and procedures used in terminating single-phase and three-phase aerial and URD systems at residential and commercial customer locations. Includes coverage of revenue meters and street light connections.

**Distribution Line Maintenance**
Trainee $20
(Module ID 80206-11) Describes the inspection process and the methods and procedures used to inspect and maintain poles, conductors, and equipment used in aerial and URD systems. Includes coverage of transformer testing; location and correction of faults in URD systems; load management systems; and protective device coordination.

**Troubleshooting**
Trainee $20
(Module ID 80304-12) Focuses on the methods used to safely locate and correct faults in aerial and URD systems. Includes troubleshooting methods as well as work site preparation.

**Introduction to Smart Grids**
Trainee $20
(Module ID 80305-12) Describes the network of transmission and distribution lines that delivers electricity between generating sources and consumers, and explains how the smart grid overlays this network to maintain a balance between power availability and demand.

**Fundamentals of Crew Leadership**
Trainee $20
(Module ID 46101-11, Second Edition) Covers basic leadership skills and explains different leadership styles, communication, delegating, and problem solving. Jobsite safety and the crew leader's role in safety are discussed, as well as project planning, scheduling, and estimating. Includes performance tasks to assist the learning process.

**Conductors and Cables**
Trainee $20
(Module ID 82202-12) Identifies the many types, sizes, and applications of conductors and cables. Fiber-optic cable is also introduced. Reviews the use of cable drawings and schedules. Provides coverage of the methods of routing cables underground in the substation environment.

**Cable Tray**
Trainee $20
(Module ID 26207-11; from Electrical Level Two, Seventh Edition)

**Conduit Bending**
Trainee $20
(Module ID 26204-11; from Electrical Level Two, Seventh Edition)

**Conductor Installations**
Trainee $20
(Module ID 26206-11; from Electrical Level Two, Seventh Edition)

**Conductor Terminations and Splicing**
Trainee $20
(Module ID 26208-11; from Electrical Level Two, Seventh Edition)

**Grounding Systems**
Trainee $20
(Module ID 82203-12) Describes the purpose and arrangement of grounding systems installed beneath a substation. Covers the materials of construction and the approaches to reliable ground system connections. Introduces safety concerns and precautions associated with substation and grounding grid expansion.

**Grades**
Trainee $20
(Module ID 22106-12; from Heavy Equipment Operations Level One)

**Concrete Work**
Trainee $20
(Module ID 82204-12) Provides comprehensive coverage of concrete pouring and finishing techniques. Includes detailed information on concrete types and their uses. Form layout and construction, along with basic surveying skills, is presented. Also provides detailed coverage of rebar types and their common geometric forms.

**Mechanical Construction Methods and Materials**
Trainee $20
(Module ID 82205-12) Covers the diverse types of substation structures and their composition. Identifies components commonly supported by structures and the various bus forms and materials of construction. Includes thorough coverage of threaded fasteners along with mechanical torquing tools and procedures.

**Intermediate Rigging**
Trainee $20
(Module ID 38201-11; from Intermediate Rigger, Second Edition)

---

**To Order Call:** 1-800-922-0579

**Stay Connected:**

www.nccer.org/instructors

---

**Power Line Worker: Substation**

---

**Conductor Installations**
Trainee $20
(Module ID 46101-11, Second Edition) Provides an overview of monitoring and protection systems and reviews the key components that make them work. Describes feeder diagrams and their use in locating and identifying components.

**Altering Current and Three-Phase Systems**
Trainee $20
(Module ID 80201-12; from Power Line Worker: Distribution Level Two)
Coverage of testing and maintenance procedures is provided for (Module ID 82305-12) Identifies the testing procedures required for overloads, fault currents, and other incidents that can disrupt service or damage the system. Offers coverage of the components used to provide both protection and system control. An introduction to the various protective relay schemes used in today’s substations is included.

Fundamentals of Crew Leadership (20 Hours) Trainee ISBN 978-0-13-292245-6 (Module ID 46101-12, Second Edition) Covers basic leadership skills and explains different leadership styles, communication, delegation, and problem solving. Jobsite safety and the crew leader’s role in safety are discussed, as well as project planning, scheduling, and estimating. Includes performance tasks to assist the learning process.

System Protection and Control (12.5 Hours) Trainee S20 ISBN 978-0-13-296795-2 (Module ID 82304-12) Describes the procedures and materials required to prepare and complete terminations and splices on insulated and non-insulated conductors and cables. Coverage is provided for both medium- and high-voltage circuits. Hydraulic presses and crimpers are introduced, along with hi-pot testing procedures for terminations and splices.

Equipment Testing and Maintenance (30 Hours) Trainee ISBN 978-0-13-296798-3 (Module ID 82305-12) Identifies the testing procedures required and explains how to properly maintain substation components. Coverage of testing and maintenance procedures is provided for power transformers, potential devices, various circuit breakers, disconnects and switches, capacitors, and reactors.

ADD MORE TEXT HERE
Field Safety

Safety Learning Series

The Safety Learning Series consists of three separate titles comprising a suggested education path: the Basic Safety module from Core Curriculum, Field Safety, and Safety Technology. The curriculum was built on industry best practices by a team of safety professionals and meets the training needs of the craft professional, safety technician, and safety manager. The modularized structure of the curriculum enables companies to cost-effectively customize training programs and offer industry credentials through the NCCER Registry System. The Safety Learning Series has been recognized by the Board of Certified Safety Professionals (BCSP). Completion of the Safety Learning Series will help personnel prepare for the Safety Trained Supervisor Construction (STSC) and Construction Health and Safety Technologist (CHST) certification exams administered by BCSP. BCSP sets and certifies technical competency criteria for safety, health, and environmental practitioners worldwide.

Steel Erection (2.5 hours)
Trainee $20
ISBN 978-0-13-340364-0
(Module ID 75110-13) Covers common safety precautions related to steel-erection work, including controlled decking zones, hazardous materials and equipment precautions, tool and appropriate personal protective equipment.

Heavy Equipment, Forklift, and Crane Safety
(5 hours)
Trainee $20
(Module ID 75123-13) Covers the safety hazards and precautions necessary when working near heavy equipment. Presents general safety requirements for the use of forklifts and cranes.

Concrete and Masonry (2.5 hours)
Trainee $20
(Module ID 75119-13) Describes the personal protective equipment that must be used when working with concrete and masonry as well as the common jobsite and health hazards associated with this type of work.

Introduction to Materials Handling (5 hours)
Trainee $20
(Module ID 75124-13) Explains the safety precautions required when transporting, handling, rigging, stacking, and storing various types of loads. It also covers safe lifting procedures.

Concrete and Masonry

Field Protection Orientation

Managing Electrical Hazards

NEW!

Horizontal Directional Drilling Hazards

(Construction Site Safety Orientation)
12.5 Hours
Revised: 2015
Module ID 00101-15
This module, from Core Curriculum, replaces the Safety Orientation book. See p. 14 for more information.

Managing Electrical Hazards

12.5 Hours Updated in 2018.
Module ID 26501
See p. 24 for more information.

Horizontal Directional Drilling Hazards

2.5 Hours
Module ID 75113-03
PAPERBACK Trainee Guide: $20
Contact your Pearson/NCCER executive director to order.
Introduces the hazards related to performing and working near horizontal directional drilling operations. Covers related on-site safety and emergency-response procedures.

Fall Protection Orientation

Trainee Guide: $25
(Module ID 75121-13) Describes the basic precautions necessary to avoid electrical shock, arc, and blast hazards. It also describes the lockout/tagout procedure.

Working from Elevations (5 hours)
Trainee $20
(Module ID 75122-13) Explains the use of fall-protection equipment. Covers safety precautions related to elevated work surfaces, including ladders, scaffolding, and aerial lifts.

Stay Connected: www.nccer.org/instructors

To Order Call: 1-800-922-0579
SAFETY TECHNOLOGY

Curriculum Notes

• 45 Hours
• Updated in 2018.
• Provides instruction on how to implement and administer a company safety program. This manual is designed for field managers, safety directors, safety committees, owner safety representatives, and insurance/loss control representatives.
• Downloadable instructor resources that include module tests, PowerPoint®s, and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK
Participant Guide: $85 978-0-13-444636-3

Product Supplements
Safety PowerPoint® Presentation Slides

(One CD includes PowerPoints® for Safety Orientation, Field Safety (First Edition), and Safety Technology)

MODULES
All of the modules listed below are included in the Participant Guide. The following ISBN and pricing information is for ordering individual modules only.

Introduction to Safety Technology (2.5 hours)
Trainee S20 978-0-13-451725-4
(Module ID 75201) Describes the responsibilities of a safety technician and identifies the basic components of a safety program. It also provides an overview of regulatory requirements.

Positive Safety Communication (2.5 hours)
Trainee S20 978-0-13-453892-1
(Module ID 75205) Explains how to support an effective safety culture on the job site, including communication techniques, motivation, and responding to behavioral issues.

Hazard Recognition, Environmental Awareness, and Occupational Health (5 hours)
Trainee S20 978-0-13-453896-9
(Module ID 75219) Covers environmental and safety hazards. It explains how to evaluate risks and identify appropriate methods of hazard control. It also discusses environmental regulations for hazardous materials and describes the elements of a medical surveillance program.

Job Safety Analysis and Pre-Task Planning (5 hours)
Trainee S20 978-0-13-453897-6
(Module ID 75220) Provides guidance on safety performance analysis and employee coaching. It also explains how to complete job and task safety planning.

Safety Data Tracking and Trending (5 hours)
Trainee S20 978-0-13-451727-8
(Module ID 75221) Covers how to conduct safety inspections, audits, and employee safety observations. It discusses both traditional and predictive methods of performance measurement, and explains how to analyze safety data in order to prevent future incidents.

Site-Specific Safety Plans (5 hours)
Trainee S20 978-0-13-453900-3
(Module ID 75222) Explains how to use pre-bid checklists to identify hazards and develop a site safety plan. It also describes how to develop an emergency action plan.

Safety Orientation and Safety Meetings (5 hours)
Trainee S20 978-0-13-451729-2
(Module ID 75223) Describes how to prepare and deliver effective training using both formal safety meetings and tailgate talks.

Permits and Policies (5 hours)
Trainee S20 978-0-13-451735-3
(Module ID 75224) Provides an overview of the various work permits required on a construction site. It also provides detailed procedures for completing a hot work permit, lockout/tagout, and confined-space entry permit.

Incident Investigations, Policies, and Analysis (5 hours)
Trainee S20 978-0-13-451734-6
(Module ID 75225) Describes how to conduct an incident investigation, including employee interviews and reporting requirements. It also explains how to analyze an incident to determine the root cause and prevent future incidents.

OSHA Inspections and Recordkeeping (5 hours)
Trainee S20 978-0-13-451733-9
(Module ID 75226) Discusses the OSHA requirements for record-keeping and explains how to manage the safety and health records for a job site. It also covers the two main types of OSHA inspections.
WE’VE MADE IT EASIER THAN EVER TO SHOP NCCER AND BYF!

For instructor/assessment materials, test packages, BYF resources and more, now purchase online at shop.nccer.org.
The new testing system makes module testing easier than ever.

1. **Multiple Test Versions** - Automatically scrambles test questions for you.

2. **Electronic Format** - Create, launch, score and submit module tests all online.

3. **Web-Based Platform** - No special software or hardware requirements.

4. **Proctor Station** - Administer tests easily and quickly.

5. **Responsive Design** - Automatically conforms to multiple devices (i.e. laptops, tablets, Google Chromebooks & Macbooks).

Visit nccer.org/testing to find out why you should make the switch!
Get industry-recognized credentials.

The construction industry needs 1.4 million craft professionals by 2024*. Employers look for credentials that validate knowledge and skills. NCCER offers standardized training, assessments and credentials for the construction industry.

Get trained. Get skills. Get certified.

✓ DRIVE.
✓ HONOR.
✓ LOYALTY.
✓ INTEGRITY.
✓ LEADERSHIP.

GET CREDENTIALS FOR THE TRAINING YOU RECEIVED IN THE MILITARY

Veterans and transitioning military can receive NCCER industry-recognized credentials for the training they received while in the service. These credentials allow employers to hire veterans at the correct skill level, provide competitive pay and continue training where the service left off.

Join the fast track to employment and build your career at veterans.byf.org.
HIGH DEMAND SALARIES POTENTIAL

EVERYTHING STARTS WITH CONSTRUCTION.

With 7 out of every 10 jobs requiring less than a bachelor’s degree, craft professionals enjoy lucrative careers and little-to-no debt.

To learn the facts, hear from successful leaders and see the steps needed to get started, visit Build Your Future’s new website for the resources to inspire the next generation.

Explore the pride, tradition and legacy at discover.byf.org.
INDUSTRY-RECOGNIZED CREDENTIALS MATTER

Your students are spending the time to get the right training, now make sure they get the credentials they deserve.

Find out how you can offer NCCER’s industry-recognized, portable credentials that owners and contractors look for by visiting nccer.org.

NCCER PARTNERS

• American Fire Sprinkler Association
• Associated Builders and Contractors, Inc.
• Associated General Contractors of America
• Association for Career and Technical Education
• Association for Skilled and Technical Sciences
• Construction Industry Institute
• Construction Users Roundtable
• Design Build Institute of America
• Gulf States Shipbuilders Consortium
• ISN Software Corporation
• Manufacturing Institute
• Mason Contractors Association of America
• Merit Contractors Association of Canada
• NACE International
• National Association of Women in Construction
• National Insulation Association
• National Technical Honor Society
• NAWIC Education Foundation
• North American Crane Bureau
• North American Technician Excellence
• Pearson
• Prov
• SkillsUSA®
• Steel Erectors Association of America
• U.S. Army Corps of Engineers
• University of Florida, M.E. Rinker, Sr. School of Construction Management
• Women Construction Owners & Executives, USA

To place an order:
Call 1.800.922.0579
Visit nccer.org/bookstore

ISBN: 9780135823910