2019 NCCER CURRICULUM CATALOG

BUILT FOR INDUSTRY, BY INDUSTRY.
Standardized, competency-based curricula for construction professionals.
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.
**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 ncercir.com. (Access code is required.)
  - No.
    - Code is provided in the printed Instructor Guide, which may be purchased through Pearson Ordering Department.
    - Note: When calling, have the ISBN from the catalog or online bookstore available.

### Additional FAQs:
- **Pipeline ordering information:** Visit ncerc.org/pipeline-program.
# 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](http://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

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Visit [nccerconnect.com](http://nccerconnect.com) and sign in. Click the gear button on your active courses to get course details.

Visit [nccerconnect.com](http://nccerconnect.com) and click the Get Support button located in the light green bar.

Visit [nccerconnect.com](http://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](http://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.
# PEARSON CONTACT INFORMATION

<table>
<thead>
<tr>
<th>Region 1</th>
<th>Brian Mann</th>
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<tbody>
<tr>
<td>Ballston Spa, NY</td>
<td></td>
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<tr>
<td>Tel: 1-800-720-3870 ext. 5</td>
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<td><a href="mailto:brian.mann@pearson.com">brian.mann@pearson.com</a></td>
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<tr>
<td>Rexford, NY</td>
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<tr>
<td>Tel: 1-800-720-3870 ext. 3</td>
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<th>Susan Muggeo</th>
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<tr>
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<td>DC, FL, GA, MD, NC, SC, VA</td>
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<tr>
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<th>Karen Keith</th>
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<tr>
<td>San Luis Obispo, CA</td>
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<tr>
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<tr>
<th>Region 6</th>
<th>Melinda Neri</th>
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<tr>
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**International Orders:** Phone: 1-800-635-3889 | Email: intlcs@pearsoned.com
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 is a not-for-profit education foundation created to help address the critical workforce shortage facing the construction industry and to develop industry-driven standardized craft training programs with portable credentials. With the support of its publishing partner Pearson, NCCER leads the industry in building a safe, productive and sustainable workforce of craft professionals.
Thank You

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
Austal 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
Now Available

Earn industry-wide recognition for your construction superintendents and workforce development leaders.

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.

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**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.

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## 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 Pipemaker***
- **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
Instructor Resources

INTRODUCING THE

Instructor Portal

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](http://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](http://www.nccer.org/collections).
NCCER’s Expanded Digital & Customer Service Offerings

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.
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 even 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.

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.

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 (Weidling)

The three digits before the hyphen are unique module identifiers.

The two-digit suffix (15) previously indicating the year of publication will be removed.
Introduction to Basic Rigging (7.5 Elective Hours)  
Trainee $20  
(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)  
Trainee $20  
(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)  
Trainee $20  
(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 $20  
(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 Notes
- Core Curriculum is a prerequisite to most Level 1 completions and must be purchased separately.
- 72.5 Hours (plus 7.5 Elective/Optional Hours)
- Revised: 2015, Fifth Edition
- Downloadable instructor resources that include module tests, PowerPoint®️, and performance profile sheets are available at www.nccer.org/irc.
- A Spanish translation of the fifth edition is available. Please see NCCER’s online catalog for more information.

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

Enhance your construction training with these supplemental Core Curriculum companions. The following titles are excellent resources for your existing program. They can be used on a standalone basis or in combination with the Core Curriculum.

Applied Construction Math: A Novel Approach

Basic Safety (Construction Site Safety Orientation)

Basic Safety

PAPERBACK  ISBN
Trainee Guide: $30  978-0-13-227298-8

This module, from Core Curriculum, replaces the Safety Orientation book. See see the module description located in the left column of this page for more information.
Core Curriculum (continued)

**Tools for Success**

Critical Skills for the Construction Industry

Revised: 2009, Third Edition

PAPERBACK


Trainee Workbook: $32

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.

**Your Role in the Green Environment**

15 Hours

Updated: 2015, Third Edition

Module ID 70101-15

PAPERBACK

ISBN 978-0-13-294863-0

Trainee Guide: $30

• 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

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**Boilermaking**

**MODULES**

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

**Boiler Systems and Components** (22.5 Hours)

Trainee $20


(Module ID 34201-11) Introduces basic boiler components and explains their functions.

**Identifying and Installing Valves** (20 Hours)

Trainee $20


(Module ID 34202-11) 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.

**Pipe Hangers and Supports** (25 Hours)

Trainee $20


(Module ID 34203-11) Introduces pipe hangers and supports and explains how to interpret pipe support drawings and symbols. Explains how to select, store, handle, install, and maintain spring can supports.

**Drawings and Detail Sheets** (15 Hours)

Trainee $20


(Module ID 34204-11) Explains how to read drawings and their symbols. Covers plot plans, structural drawings, elevation drawings, as-built drawings, equipment arrangement drawings, piping and instrumentation drawings, isometric drawings, spool sheets, detail sheets, and orthographic drawings.

**Fasteners and Anchors** (5 Hours)

Trainee $20


(Module ID 34205-11) 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.

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**Basic Materials** (10 Hours)

Trainee $20


(Module ID 34104-10) Identifies materials used in the construction of boilers, including material properties, standards and codes, and material markings.

**Oxyfuel Cutting** (17.5 Hours)

Trainee $20


(Module ID 34105-10) 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

(Module ID 34106-10) Describes gasket materials used in mating flanges and procedures for laying out and cutting a flange gasket.

**Base Metal Preparation** (10 Hours)

Trainee $20


(Module ID 34107-10) 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

(Module ID 34108-10) Describes welding and cutting processes and related equipment. Includes filler metals, joint design, and the codes that govern welding practices.

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**Boiler Safety** (12.5 Hours)

Trainee $20


(Module ID 34102-10) Covers safety issues specific to boilermakers on the job.

**Boilermaking Tools** (15 Hours)

Trainee $20


(Module ID 34103-10) Introduces the hand and power tools used by boilermakers, and the associated safety concerns.

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**Your Role in the Green Environment**

15 Hours

Updated: 2015, Third Edition

Module ID 70101-15

PAPERBACK

ISBN 978-0-13-294863-0

Trainee Guide: $30

• 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
Welding Symbols (5 Hours)
(Module ID 34206-11) Explains how to read symbols on welding drawings, specifications, and welding procedure specifications. Describes the symbols for fillet welds, groove welds, miscellaneous other welds, and nondestructive tests.

Socket Weld Pipe Fabrication (25 Hours)
(Module ID 34207-11) Describes different types of socket weld piping materials and fittings and how to read socket weld piping drawings. Explains how to determine pipe lengths between socket weld fittings, as well as how to mate socket weld fittings to pipe.

Butt Weld Pipe Fabrication (40 Hours)
(Module ID 34208-11) Covers preparing pipe ends for butt welding; determining pipe lengths between butt weld fittings; and using welding jigs to align pipe and butt weld fittings for welding. Explains how to select and install backing rings.

Tube Weld Preparation and Fitting (15 Hours)
(Module ID 34209-11) Describes methods used to gain access to boiler tubes needing repair, and to prepare boiler tubes for replacement. Explains how to fit-up a section of boiler tube. Describes welding procedures for making butt welds on standard carbon steel tubes and composite tubes.

Air Carbon Arc Cutting and Gouging (12.5 Hours)
Trainee S20 ISBN 978-0-13-257796-0
(Module ID 34210-11) Describes air carbon arc cutting (CAC-A) equipment and processes. Explains how to select and install CAC-A electrodes, and how to prepare the work area and CAC-A equipment for safe operation. Provides instructions for using CAC-A equipment for washing and gouging activities.

Boiler Nonpressure Components (15 Hours)
(Module ID 34302-11) Describes the nonpressure 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 air flow 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)
(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.

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.

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.

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)
(Module ID 08402-07; from Pipefitting Level Four)
(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 boiliers. 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 stressing 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.

Boilermaking Level 2 (continued)
Carpentry

**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 27111-13) Describes procedures for laying out and framing walls, including rough-in door and window openings, constructing corners, partition Ts, 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 27112-13) Describes types of roofs and provides instructions for laying out rafters for gable roofs, hip roofs, and valley intersections. Covers stick-built and truss-built roofs. Includes the basics of roof sheathing installation.

**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.

**Cold-Formed Steel Framing (15 Hours)**
Trainee $20
(Module ID 27205-13) Describes the types and grades of steel framing materials, and includes instructions for selecting and installing metal framing for interior and exterior walls, loadbearing and nonbearing walls, partitions, and other applications.

**Exterior Finishing (15 Hours)**
Trainee $20
(Module ID 27204-13) Covers the various types of exterior finish materials and their installation procedures, including wood, metal, vinyl, and fiber-cement siding.

**Thermal and Moisture Protection (7.5 Hours)**
Trainee $20
(Module ID 27203-13) Covers the selection and installation of various types of insulating materials in walls, floors, and attics. Also covers the uses and installation practices for vapor barriers and waterproofing materials.

**Roofing Applications (15 Hours)**
Trainee $20
(Module ID 27202-13) Describes how to properly prepare the roof deck and install roofing for residential and commercial buildings.

**Doors and Door Hardware (20 Hours)**
Trainee $20
(Module ID 27206-13) Describes the installation of metal doors and related hardware in steel-framed, wood-framed, and masonry walls, along with their related hardware, such as locksets and door closers. Also discusses the installation of wood doors, folding doors, and pocket doors.

**Drywall Installation (15 Hours)**
Trainee $20
(Module ID 27205-13) Describes how to prepare for and install drywall, including cutting and installing drywall, applying joint compound, and sanding and texturing the surface.

**Suspended Ceilings (17.5 Hours)**
Trainee $20
(Module ID 27208-13) Describes the installation of metal ceilings, including the selection of materials, preparation of installation, and maintenance.

**Elective for Residential Path (20 Hours)**
Trainee $20
(Module ID 27104-13) Covers the techniques for reading and using construction drawings and specifications, with an emphasis on drawings and information relevant to the carpentry trade. Introduces quantity takeoffs.

**Elective for Commercial Path (25 Hours)**
Trainee $20
(Module ID 27201-13) Describes how to read and interpret a set of commercial drawings and specifications.

**Commercial Drawings Elective for Residential Path (25 Hours)**
Trainee $20
(Module ID 27200-13) Describes how to read and interpret a set of commercial drawings and specifications.

**Curriculum Notes**
- 235 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: 2013, Fifth Edition
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/orc.
- A Spanish translation of the fourth edition is available. Please see NCCER’s online catalog for more information.

**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.

**Orientation to the Trade (2.5 Hours)**
Trainee $20
(Module ID 27101-13) Reviews the history of the trade, describes the apprentice program, identifies career opportunities for carpenters and construction workers, and lists the skills, responsibilities, and characteristics a worker should possess. Emphasizes the importance of safety in the construction industry.

**Building Materials, Fasteners, and Adhesives (20 Hours)**
Trainee $20
(Module ID 27102-13) Introduces the building materials used in construction work, including lumber, sheet materials, engineered wood products, structural concrete, and structural steel. Also describes the fasteners and adhesives used in construction work. Discusses the methods of squaring a building.

**Hand and Power Tools (10 Hours)**
Trainee $20
(Module ID 27103-13) Provides descriptions of hand tools and power tools used by carpenters. Emphasizes safe and proper operation, as well as care and maintenance.

**Introduction to Construction Drawings, Specifications, and Layout (22.5 Hours)**
Trainee $20
(Module ID 27104-13) Covers the techniques for reading and using construction drawings and specifications, with an emphasis on drawings and information relevant to the carpentry trade. Introduces quantity takeoffs.

**Carpentry FRAMING & FINISHING**

**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.

**Hardcover ISBN**
Trainee Guide: $69
978-0-13-340380-0

**Paperback ISBN**
Trainee Guide: $67
978-0-13-340237-7

**NCCERconnect Access Card: $67**
978-0-13-420508-3

**NCCERconnect + Hardcover Trainee Guide: $94**
978-0-13-427462-1

**NCCERconnect + Paperback Trainee Guide: $92**
978-0-13-429856-6

**To Order Call: 1-800-922-0579 www.nccer.org/instructors**
Window, Door, Floor, and Ceiling Trim (25 Hours)
Trainee $20
(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.

Reinforcing Concrete (15 Hours)
Trainee $20
(Module ID 27204-14) Provides detailed instructions for selecting, cutting, and fastening trim to achieve a professional finished appearance.

Cabinet Installation (10 Hours)
Trainee $20
(Module ID 27211-13) Provides detailed instructions for the selection and installation of base and wall cabinets and countertops.

Foundations and Slabs-On-Grade (20 Hours)
Trainee $20
(Module ID 27207-14) 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.

Site Layout: Differential Leveling (20 Hours)
Trainee $20
(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.

Carpentry Level 2 (continued)
**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**

**Cabinetmaking**

![Cabinetmaking Image](image)

**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 hands-on operation and demonstration of larger pieces of power equipment. |

**Preparing for Placement (12.5 Hours)**

Trainee S20  | 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 S20  | 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. |

**L1 CONCRETE FINISHING**

**Curriculum Notes**

- 160 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.)
- Published: 1998
- A Spanish translation is available. Please see NCCER’s online catalog for more information.
- Downloadable instructor resources that include module tests, PowerPoints©, and performance profile sheets are available at www.nccer.org/irc.

**PAPERBACK**  | ISBN 978-0-13-010246-1 |
| Trainee Guide: $67 |

**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 Concrete Construction and Finishing (10 Hours)**

| (Module ID 23101) Provides an introduction to the methods and procedures used in concrete finishing. Introduces terms of the trade and tools and equipment used to place, finish, and cure concrete. Explains methods and techniques for constructing concrete structures. |

**Safety Requirements (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. |

**L2 CONCRETE FINISHING**

**Curriculum Notes**

- 167.5 Hours
- Published: 1999
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

| 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.

**Properties of Concrete, Part Two (10 Hours)**

| (Module ID 23201) Describes the physical and chemical properties of materials used in a concrete mix. Includes descriptions of chemical and mineral admixtures, lightweight concrete, high strength concrete, flowable fill, and types of paving materials. Discusses expected results of the use of admixtures. |
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 descriptions and techniques for form types, 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)
Trainee $20 ISBN 978-0-13-015040-0
(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. Describes 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 shakes, self-leveling toppings, 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.

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 27306-14; 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 Carpentry 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 Carpenter Level One)
Roofing Applications (25 Hours)  
(Module ID 27202-13; from Carpenter 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)

Residential Electrical Services (15 Hours)  
(Module ID 26411-14; from Electrical Level One)
Introduction to HVAC (7.5 Hours)  
(Module ID 03401-13; 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)
Copper Tube and Fittings (12.5 Hours)  
(Module ID 02107-12; from Plumbing Level One)
Cabinetmaking (35 Hours)  
(Module ID 27501-15)
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)

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 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.

L1 DRYWALL

DRYWALL
LEVEL 1

Curriculum Notes

• 147 Hours (Includes 72.5 hours of Core Curriculum, which  
is a prerequisite for completion and must be purchased  
separately. See p. 14 for ordering information.)
• Published: 2007
• 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.

PAPERBACK  
Trainee Guide: $67  
ISBN 978-0-13-604512-0

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

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 Level 2 (continued)

**Steel Framing** (50 Hours)
(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 nonbearing walls, and partitions. Also covers engineered framing systems.

**Acoustical Ceilings** (20 Hours)
(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 pan-type ceilings.

**Exterior Cladding** (20 Hours)
(Module ID 45205-09) Covers a variety of specialized exterior finish products, such as EIFS, stucco, synthetic veneer stone, panelized cladding, and glass fiber-reinforced concrete (GFRC) panels.

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

**Electrical Theory** (7.5 Hours)
Trainee S20 ISBN 978-0-13-480481-1
(Module ID 26104-17) Introduces series, parallel, and series-parallel circuits. Covers resistive circuits, Kirchhoff’s voltage and current laws, and circuit analysis.

**Introduction to the National Electrical Code** (7.5 Hours)
(Module ID 26105-17) Provides a road map for using the NEC. 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)
(Module ID 26106-17) Covers the electrical devices and wiring techniques common to residential construction and maintenance. Allows trainees to practice making service calculations. Stresses the applicable NEC requirements.

**Basic Electrical Construction Drawings**
(Module ID 26110-17) Describes electrical prints, drawings, and symbols, and the types of information that can be found on schematics, one-lines, and wiring diagrams.

**Residential Electrical Services** (15 Hours)
(Module ID 26111-17) Covers the electrical devices and wiring techniques common to residential construction and maintenance. Allows trainees to practice making service calculations. Stresses the applicable NEC requirements.

**Electrical Test Equipment** (5 Hours)
(Module ID 26112-17) Covers proper selection, inspection, and use of common electrical test equipment, including voltage testers, clamp-on ammeters, ohmmeters, multimeters, phase/motor rotation testers, and data recording equipment. Also covers safety precautions and meter category ratings.
Electrical Level 2 (continued)

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
(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
(Module ID 26202-17) Covers AC and DC motors, including the main components, circuits, and connections.

Electric Lighting (15 Hours)
Trainee $20
(Module ID 26204-17) Describes fuses and circuit breakers for various applications. Also covers short circuit calculations and troubleshooting.

Conduit Bending (15 Hours)
Trainee $20
(Module ID 26205-17) Explains how to select and size pull boxes, junction boxes, and handholes.

Pull and Junction Boxes (12.5 Hours)
Trainee $20
(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
(Module ID 26207-17) Focuses on NEC® installation requirements for cable tray, including cable installations.

Conductor Terminations and Splices (7.5 Hours)
Trainee $20
(Module ID 26208-17) Describes methods of terminating and splicing conductors, including preparing and taping conductors.

Grounding and Bonding (15 Hours)
Trainee $20
(Module ID 26209-17) Focuses on the purpose of grounding and bonding electrical systems. Thoroughly covers NEC® requirements.

Circuit Breakers and Fuses (12.5 Hours)
Trainee $20
(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
(Module ID 26211-17) Gives basic descriptions of various types of contactors and relays along with their practical applications.

L3 ELECTRICAL

Curriculum Notes
• 155 Hours
• Revised: Summer 2017, Ninth Edition, to reflect 2017 NEC®
• Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK ISBN
Trainee Guide: $97
978-0-13-473823-9
NCCERconnect Access Card: $97
978-0-13-481266-3
NCCERconnect + Trainee Guide: $122
978-0-13-482070-5

Motor Calculations (12.5 Hours)
Trainee $20
(Module ID 26309-17) Covers calculations required to size conductors and overcurrent protection for motor applications.

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

Motor Controls (12.5 Hours)
Trainee $20
(Module ID 26311-17) Provides information on selecting, sizing, and installing motor controllers. Also covers control circuit pilot devices and basic relay logic.

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
(Module ID 26301-17) Explains how to calculate branch circuit and feeder loads for residential and commercial applications.

Conductor Selection and Calculations (15 Hours)
Trainee $20
(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
(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
(Module ID 26304-17) Presents the NEC® requirements for equipment installed in hazardous locations.

Overcurrent Protection (25 Hours)
Trainee $20
(Module ID 26305-17) Explains how to size and select circuit breakers and fuses for various applications. Also covers short circuit calculations and troubleshooting.

Distribution Equipment (12.5 Hours)
Trainee $20
(Module ID 26306-17) Discusses switchboards and switchgear, including installation, grounding, and maintenance requirements. Includes a set of drawings.

Transformers (12.5 Hours)
Trainee $20
ISBN 978-0-13-480527-6
(Module ID 26307-17) Discusses transformer types, construction, connections, protection, and grounding.

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

L4 ELECTRICAL

Curriculum Notes
• 182.5 Hours
• Revised: Summer 2017, Ninth Edition, to reflect 2017 NEC®
• Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK ISBN
Trainee Guide: $97
978-0-13-473822-2
NCCERconnect Access Card: $97
978-0-13-481268-7
NCCERconnect + Trainee Guide: $122
978-0-13-482071-2

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

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

Health Care Facilities (10 Hours)
Trainee $20
(Module ID 26402-17) Covers the installation of electric circuits in health care facilities, including the requirements for life safety and critical circuits.

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

Basic Electronic Theory (10 Hours)
Trainee $20
(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
ISBN 978-0-13-480547-4
(Module ID 26405-17) Covers fire alarm control units, Digital Alarm Communicator Systems (DACS), wiring for alarm initiating and notification devices, and alarm system maintenance.
Managing Electrical Hazards

Introduces electrical hazards in the workplace and describes how to avoid them. Explains how to analyze and document shock and arc flash hazards, and 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.

Electronic Systems Technician

Wood and Masonry Construction Methods

(12.5 Hours)
(Module ID 33102-10) Reviews the materials and techniques used in constructing and finishing residential and commercial buildings, including wood frame, brick and block, and post and beam. Covers common drills, bits, and techniques used to drill through wood and masonry. Also describes types of fasteners used with these materials.

Concrete and Steel Construction Methods

(12.5 Hours)
(Module ID 33103-10) Describes the materials and techniques used in constructing and finishing residential and commercial buildings, including poured and prefabricated concrete and structural steel. Covers common drills, bits, and techniques used to drill through concrete and steel. Also describes types of fasteners used with these materials.
Pathways and Spaces (12.5 Hours)
(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)
(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.

Hand Bending of Conduit (7.5 Hours)
(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)
(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)
(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)
(Module ID 33200-10) Introduces electrical concepts used in Ohm’s law as applied to DC series circuits. Describes atomic theory, electrostatic 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)
(Module ID 33202-10) Introduces AC theory, circuits, and components, including inductors, capacitors, and transformers. Covers the calculation of reactance and impedance in RL, RC, LC, and RLC circuits using math and vector analysis.

Switching Devices and Timers (15 Hours)
(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)
(Module ID 33204-10) Introduces the principles of electronics and semiconductor theory, components, and applications.

Test Equipment (10 Hours)
(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)
(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)
(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)
(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)
(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)
(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.

L3 ELECTRONIC SYSTEMS TECHNICIAN

Curriculum Notes
- 152.5 Hours
- Revised: 2011, Third Edition
- 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.

Buses and Networks (25 Hours)
(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)
(Module ID 33302-11) Introduces the types of equipment and methods used in fiber-optic cable installation.

Wireless Communication (10 Hours)
(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)
(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.
Fundamentals of Crew Leadership (20 Hours)
Trainee $43
(Module ID 46101-11, Second Edition) Covers basic leadership skills and explains different leadership styles, delegation, problem solving, and safety. Examines the crew leader's role in chemical safety, especially as it relates to project planning, scheduling, and estimating. Includes performance tasks to assess the learning process.

Rack Assembly (17.5 Hours)
Trainee $20
(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 $20
(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 $20
(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.

MODELS
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 $20
(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 $20
(Module ID 33402-12) Describes the types of equipment used in various video systems and equipment, including both analog and digital video, video recording, display devices, HDTV, 3-D video, and video processing and distribution.

Broadband Systems (40 Hours)
Trainee $20
(Module ID 33403-12) Describes the major elements of head-end design for specialized television systems, including CATV, SMATV, and MATV systems. Explains the functions 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 $20
(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 $20
(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).

Residential and Commercial Building Networks (25 Hours)
Trainee $20
(Module ID 33406-12) Describes how home and business systems such as fire alarms, security, energy, and entertainment can be integrated using specialized smart home and building management software and controllers. Discusses best practices for system interoperability and performance. Discusses various interconnection options and integration protocols.

Intrusion Detection Systems (30 Hours)
Trainee $20
(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 $20
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 $20
(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 $20
(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. Includes test and troubleshooting equipment.

Access Control Systems (35 Hours)
Trainee $20
(Module ID 33411-12) Introduces access control systems, including access cards, keyless locking systems, readers, biometrics, and controllers. Emphasizes installation practices as well as building and electrical codes.

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 SBSA'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 for which a minimum of 100 hours is required.

PAPERBACK
Trainee Guide: $97
NCCERconnect Access Card: $97
NCCERconnect + Trainee Guide: $122
Heavy Equipment Operations

Introduction to Earthmoving (12.5 Hours)
Trainee $20
(Module ID 22201-12) Provides a broad 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)
Trainee $20
(Module ID 22106-12) Introduces the concept of preparing graded surfaces using heavy equipment. Covers identification of construction stokes and interpretation of marks on each type of grade. Describes the process for grading slopes.

Site Work (20 Hours)
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.

Soils (10 Hours)
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)
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)
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)
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.

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www.nccer.org/instructors

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Heavy Equipment Operations Level 3

**Compaction Equipment (25 Hours)**
Trainee $20
(Module ID 22303-14) Identifies and describes the common uses, types, components, instruments, controls, and attachments of a roller. Describes safety guidelines associated with compaction equipment; and prestart inspection, 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
(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 excavators. Presents safety guidelines, prestart inspection procedures, and preventive maintenance requirements. Describes basic startup and operation, and covers common work activities associated with excavators.

**Motor Graders (40 Hours)**
Trainee $20
(Module ID 22309-13) 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.

Heavy Highway Construction

**Heavy Highway Construction Safety** (5 Hours)
Trainee $20
(Module ID 75104-13; from Field Safety) Describes basic startup, driving maneuvers, loading, and dumping procedures for heavy highway construction safety.

**Soils** (10 Hours)
(Module ID 22308-13; from Heavy Equipment Operations Level Two) Presents safety guidelines, prestart inspection procedures, and preventive maintenance requirements. Covers basic startup, driving maneuvers, loading, and dumping procedures for off-road dump trucks.

**Site Work** (20 Hours)
(Module ID 22210-13; from Heavy Equipment Operations Level Two) Presents safety guidelines, prestart inspection procedures, and preventive maintenance requirements. Covers basic startup, driving maneuvers, loading, and dumping procedures for off-road dump trucks.

**Excavation Math** (17.5 Hours)
(Module ID 22207-13; from Heavy Equipment Operations Level Two) Presents safety guidelines, prestart inspection procedures, and preventive maintenance requirements. Covers basic startup, driving maneuvers, loading, and dumping procedures for off-road dump trucks.

**Interpreting Civil Drawings** (20 Hours)
(Module ID 22209-13; from Heavy Equipment Operations Level Two) Presents safety guidelines, prestart inspection procedures, and preventive maintenance requirements. Covers basic startup, driving maneuvers, loading, and dumping procedures for off-road dump trucks.

**Rigging Practices** (15 Hours)
(Module ID 36102-18; from Basic Rigger) Presents safety guidelines, prestart inspection procedures, and preventive maintenance requirements. Covers basic startup, driving maneuvers, loading, and dumping procedures for off-road dump trucks.

**Plant Operations** (7.5 Hours)
Trainee $20
(Module ID 36111-17) Describes the types of heavy equipment, utility equipment, and cranes used in the construction of bridges and highways. Trainees will be expected to recognize the equipment and describe its use.

**Crane Communications** (10 Hours)
(Module ID 53101-18; from Signal Person) Presents safety guidelines, prestart inspection procedures, and preventive maintenance requirements. Covers basic startup, driving maneuvers, loading, and dumping procedures for off-road dump trucks.

**Trenching and Excavating** (15 Hours)
(Module ID 27306-14; from Crew Leader Level Three) Presents safety guidelines, prestart inspection procedures, and preventive maintenance requirements. Covers basic startup, driving maneuvers, loading, and dumping procedures for off-road dump trucks.

**Introduction to Earthmoving** (12.5 Hours)
(Module ID 22211-12; from Heavy Equipment Operations Level One) Presents safety guidelines, prestart inspection procedures, and preventive maintenance requirements. Covers basic startup, driving maneuvers, loading, and dumping procedures for off-road dump trucks.

**Finishing and Grading** (25 Hours)
(Module ID 22307-14; from Heavy Equipment Operations Level Three) Presents safety guidelines, prestart inspection procedures, and preventive maintenance requirements. Covers basic startup, driving maneuvers, loading, and dumping procedures for off-road dump trucks.

**Plant Operations** (7.5 Hours)
Trainee $20
(Module ID 36107-17) Explains the operation of plants used to manufacture concrete and asphalt paving and describes the different types of aggregates.
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 27304-14; from Carpentry Level Three)
Trainee $20

Working with Concrete (15 Hours)
(Module ID 36112-17) Introduces the trainees to the safety concerns associated with concrete, as well as concrete heating, concrete admixtures, and the proper procedure for placing concrete.

Trade Drawings One (12.5 Hours)
(Module ID 30108-1; 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.

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.

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.

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

Systems. Includes installation, service, and repair procedures. Compressors used in comfort air conditioning and refrigeration reviews electrical safety. Techniques used in testing AC circuits and components. Also operation of induction motors, and the instruments and

Alternating Current Guide. The following ISBN and pricing information is for All of the modules listed below are included in the Trainee Module ID 03202) Covers the principles of venting fossil fuel furnaces and methods for selecting and installing vent systems for gas-fired heating equipment.


Commercial Airside Systems (12.5 Hours) Trainee $20 ISBN 978-0-13-378006-2 (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 978-0-13-378007-9 (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) Trainee $20 ISBN 978-0-13-378008-6 (Module ID 03203) Introduces hot water heating systems, focusing on safe operation of the low-pressure boilers and piping systems in residential applications.

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


Metering Devices (12.5 Hours) Trainee $20 ISBN 978-0-13-382754-5 (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 978-0-13-378001-7 (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 978-0-13-378002-4 (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.


Commercial Airside Systems (12.5 Hours) Trainee $20 ISBN 978-0-13-378006-2 (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 978-0-13-378007-9 (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) Trainee $20 ISBN 978-0-13-378008-6 (Module ID 03203) Introduces hot water heating systems, focusing on safe operation of the low-pressure boilers and piping systems in residential applications.

L2 HVAC 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: $97 978-0-13-378002-4
NCCERconnect Access Card: $97 978-0-13-414605-8
NCCERconnect + Trainee Guide: $122 978-0-13-427460-7

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.

Fasteners, Hardware, and Wiring Terminations (10 Hours) Trainee $20 ISBN 978-0-13-377999-8 (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 978-0-13-382407-0 (Module ID 03314) Provides information and skills to troubleshoot control circuits and electric motors found in heating and cooling equipment.


Troubleshooting Oil Heating (15 Hours) Trainee $20 ISBN 978-0-13-382404-9 (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 978-0-13-382438-4 (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 978-0-13-340346-6 (Module ID 03303) 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 978-0-13-340347-3 (Module ID 03304) 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.

Zoning, Ductless, and Variable Refrigerant Flow Systems (15 Hours)
Trainee $20
ISBN 978-0-13-378109-0
(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
ISBN 978-0-13-378112-0
(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
ISBN 978-0-13-378143-4
(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
ISBN 978-0-13-378173-1
(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-builts. 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 $45
(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

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

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.

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 69102-09) Explains the elements of corrosion in coatings industry, including career opportunities and an introduction to coatings safety.

Surface Preparation Two (80 Hours)
Trainee $20
(Module ID 69204-10) Discusses the types of containment appropriate to various coating and surface preparation applications, including standards and verification. Also covers containment erection and repair.

Coating Application Two (105 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.

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.

Work Planning and Quality Control (25 Hours)
Trainee $20
(Module ID 69103-09) Describes types of coatings, their advantages and disadvantages, applications, and specific preparations required.

Module 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

LEVEL 1
INDUSTRIAL COATING AND LINING APPLICATION SPECIALIST

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

Basic Safety (15 Hours)
Trainee $20
(Module ID 69101-04; from Core Curriculum, Third Edition)

Basic Rigging (20 Hours)
Trainee $20
(Module ID 69104-04; from Core Curriculum, Third Edition)
Trainee Guide: $103 978-0-13-604817-6

Introduction to the Trade (5 Hours)
Trainee $20
(Module ID 69101-09) Provides an introduction to the coatings industry, including career opportunities and an introduction to coatings safety.

Surface Preparation (100 Hours)
Trainee $20
(Module ID 69102-09) 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.

LEVEL 2
INDUSTRIAL COATING AND LINING APPLICATION SPECIALIST

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

Coating Application Two (105 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.

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.
INDUSTRIAL MAINTENANCE ELECTRICAL & INSTRUMENTATION TECHNICIAN

MODULES

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

Orientation to the Trade (2.5 Hours)
Trainee S20 ISBN 978-0-13-614612-4
(Module ID 40101-07) Covers the history of the trade, and provides an overview of the industrial maintenance craft. Describes apprenticeship and training programs, as well as career opportunities. Also describes the responsibilities and characteristics of successful workers.

Tools of the Trade (5 Hours)
(Module ID 40102-07) Introduces the hand and power tools used in industrial maintenance. Covers safety procedures and proper use of these tools.

Fasteners and Anchors (5 Hours)
(Module ID 40103-07) Covers hardware and systems used in industrial maintenance. Describes anchors and supports, their applications, and how to install them safely.

Oxyfuel Cutting (17.5 Hours)
(Module ID 40104-07) 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)
(Module ID 40105-07) 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)
(Module ID 40106-07) 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)
(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)
(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)
(Module ID 40109-07) Identifies different types of valves and describes their installation, storage, and handling.

Introduction to Test Instruments (7.5 Hours)
(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)
(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)
(Module ID 40113-07) Explains lubrication safety, storage, and classifications. Also explains selecting lubricants, additives, lubrication equipment, and lubricating charts.

INDUSTRIAL MAINTENANCE ELECTRICAL & INSTRUMENTATION TECHNICIAN

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.

Clean, Purge, and Test Tubing and Piping Systems (7.5 Hours)
(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.
Industrial Maintenance Electrical & Instrumentation Technician Level 2 (continued)

**Instrument Drawings and Documents, Part One (15 Hours)**
Trainee $20

- **Conductors and Cables (10 Hours)**
  - Trainee $20
  - Module ID 40212-08
  - Covers the applications of conductors and electrical cabling and covers proper wiring techniques. Stresses the applicable NEC® requirements.

- **Conductor Terminations and Splices (10 Hours)**
  - Trainee $20
  - Module ID 40213-08
  - Describes methods of terminating and splicing conductors of all types and sizes, including preparing and taping conductors.

- **Electronic Components (15 Hours)**
  - Trainee $20
  - Module ID 40301-09
  - Covers all classes of hazardous locations, including seals, components, and equipment approved for use in various hazardous locations.

- **Hydraulic Controls (15 Hours)**
  - Trainee $20
  - 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 $20
  - 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.

- **Motor Operated Valves (15 Hours)**
  - Trainee $20
  - Module ID 40309-09
  - 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.

**Distribution Equipment (17.5 Hours)**
Trainee $20

- **Conductor Selection and Calculation (15 Hours)**
  - Trainee $20
  - Module ID 40307-09
  - Covers the types of conductors used in wiring systems, including insulation, current-carrying capacity, and temperature ratings.

- **Hydraulic Controls (15 Hours)**
  - Trainee $20
  - Module ID 40301-09
  - 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 systems and provides guidelines for troubleshooting.

- **Pneumatic Controls (15 Hours)**
  - Trainee $20
  - Module ID 40301-09
  - Introduces pneumatic principles and fluids, functions and controls of system devices, pneumatic symbols, and drawings. Covers safety considerations for hydraulic systems, as well as troubleshooting.

- **Performing Loop Checks (7.5 Hours)**
  - Trainee $20
  - Module ID 40309-09
  - 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.
Troubleshooting and Commissioning a Loop (10 Hours)
(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)
(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)
(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)
(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.

Oxyfuel Cutting (17.5 Hours)
(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)
(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)
(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)
(Module ID 32107-07) 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)
(Module ID 32108-07) Explains centrifugal, rotary, reciprocating, metering, and vacuum pump operation and installation methods, as well as types of drivers. Describes positive suction head and cavitation.

Valves (5 Hours)
(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)
(Module ID 32110-07) Introduces test equipment for industrial maintenance, including ohmmeters, pyrometers, strain gauges, voltmeters, meggers, and automated diagnostic tools.

Material Handling and Hand Rigging (15 Hours)
(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)
(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)
(Module ID 32113-07) Explains lubrication safety, storage, and classifications. Also explains selecting lubricants, additives, lubrication equipment, and lubricating charts.

To Order Call: 1-800-922-0579  Stay Connected:  www.nccer.org/instructors
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 S20 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)
Trainee S20 ISBN 978-0-13-604627-1
(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.

Low-Pressure Steam Systems (10 Hours)
(Module ID 32208-07) Describes non-destructive and destructive testing of systems and equipment.

Introduction to Bearings (15 Hours)
(Module ID 32209-07) Explains the functioning of high-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)
Trainee S20 ISBN 978-0-13-604666-0
(Module ID 32211-07) Explains 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, isosceles triangles and the laws of acute triangles.

Precision Measuring Tools (20 Hours)
Trainee S20 ISBN 978-0-13-604682-0
(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)
Trainee S20 ISBN 978-0-13-604684-4
(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.

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.

Preventive and Predictive Maintenance (10 Hours)
(Module ID 32401-09) Explains preventive and predictive maintenance and non-destructive testing, and introduces the basic techniques for testing. Also describes lubricant analysis, and acoustic, infrared, and vibration testing.

Advanced Blueprint Reading (25 Hours)
(Module ID 32402-09) Describes the use of drawing sets to obtain system information. Explains the process of identifying a part of a machine for repair or replacement from a set of drawings.

Compressors and Pneumatic Systems (35 Hours)
(Module ID 32403-09) Describes the theory and practice of compressing and transporting gases. Explains the types and principles of compressors and compressed air treatment equipment, as well as compressed air use and safety.

Reverse Alignment (30 Hours)
(Module ID 32404-09) Describes preparation for dial indicator reverse alignment, and explains the procedures for setting up reverse alignment jigs. Explains graphic and mathematical techniques for aligning equipment based on reverse dial indicator measurements.

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.

Preventive and Predictive Maintenance (10 Hours)
(Module ID 32401-09) Explains preventive and predictive maintenance and non-destructive testing, and introduces the basic techniques for testing. Also describes lubricant analysis, and acoustic, infrared, and vibration testing.

Advanced Blueprint Reading (25 Hours)
(Module ID 32402-09) Describes the use of drawing sets to obtain system information. Explains the process of identifying a part of a machine for repair or replacement from a set of drawings.

Compressors and Pneumatic Systems (35 Hours)
(Module ID 32403-09) Describes the theory and practice of compressing and transporting gases. Explains the types and principles of compressors and compressed air treatment equipment, as well as compressed air use and safety.

Reverse Alignment (30 Hours)
(Module ID 32404-09) Describes preparation for dial indicator reverse alignment, and explains the procedures for setting up reverse alignment jigs. Explains graphic and mathematical techniques for aligning equipment based on reverse dial indicator measurements.

Laser Alignment (25 Hours)
Trainee S20 ISBN 978-0-13-610449-0
(Module ID 32405-09) Using one example system, describes the principles of using laser alignment systems to perform alignments.

Introduction to Supervisory Skills (15 Hours)
(Module ID 32406-09) Introduces human resource criteria, concepts, and skills for the craftsperson desiring to advance to leadership roles.
Troubleshooting and Repairing Pumps
(10 Hours)
Trainee $20
ISBN 978-0-13-610452-0
(Module ID 32407-09) Describes how to inspect, troubleshoot, disassemble, assemble, and install a pump. Also describes the process of preparing for startup.

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.

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

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 Gearboxes
(10 Hours)
Trainee $20
ISBN 978-0-13-610452-0
(Module ID 32407-09) 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.

Instrumentation

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.

Lubricants, Sealants, and Cleaners
(7.5 Hours)
Trainee $20
ISBN 978-0-13-378844-0
(Module ID 12109-14) Covers the proper use, storage, handling, and safety practices associated with various lubricants, cutting fluids, sealants, and cleaners. Includes coverage of the tools and materials used in applying lubricants and cleaning products.

Tubing
(15 Hours)
Trainee $20
(Module ID 12111-14) Introduces types of tubing, tubing materials, fittings, and tools. Covers proper storage and handling, cutting, deburring, reaming, bending, and joining of tubing.

Steel Piping Practices
(10 Hours)
Trainee $20
(Module ID 12117-14) Covers both carbon steel and stainless steel piping measuring 2” as it applies to instrumentation work. Includes instructions for calculating pipe cut length, cutting, deburring, reaming, and threadng pipe.

Hoses
(7.5 Hours)
Trainee $20
(Module ID 12113-14) Describes different types of hoses and related fittings, along with proper storage and handling. Includes instructions for cutting hoses and installing standard reusable fittings.

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In this section, we delve into the specifics of instrumentation installations, focusing on the practical aspects of handling, purging, and testing tubing and piping systems. We also examine the principles of instrument air filters, regulators, and dryers. Furthermore, we explore the intricacies of control valves, actuators, and positioners, as well as the fundamentals of control and instrumentation wiring. We cover the application of common process controls, including both pneumatic and electronic devices, and discuss wiring and grounding. This comprehensive guide is designed to equip you with the knowledge and skills necessary for a career in instrumentation.
Instrumentation Level 4 (continued)

Proving, Commissioning, and Troubleshooting a Loop (17.5 Hours)
Trainee $20
(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.

Digital Logic Circuits (17.5 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)
Trainee $20
(Module ID 12406-16) Introduces PLCs and their uses in industrial control. Includes hardware components, applications, communications, number systems, and programming methods.

Tools and Equipment of the Trade (10 Hours)
Trainee $20
(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)
Trainee $20
(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)
Trainee $20
(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)
Trainee $20
(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)
Trainee $20
(Module ID 30107-11) Identifies welding equipment and procedures. 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.

Structural Ironworking One (7.5 Hours)
Trainee $20
(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. Examines the principles of structural stresses and the requirements of bolted connections.

Plumbing, Aligning, and Guying (5 Hours)
Trainee $20
(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)
Trainee $20
(Module ID 30111-11) 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)
Trainee $20
(Module ID 30111-11) Explains how to recognize types of bar joists and how they are designated. Describes the proper procedures for rigging and storing steel joists. Explains the use of joist girders in steel joist construction systems and the proper erection procedures for bar joists. Includes OSHA Subpart R.

Metal Decking (10 Hours)
Trainee $20
(Module ID 30114-11) Identifies decking types and profiles and how decking is packaged, shipped, and stored. Describes erecting decking and job-site safety. Discusses the effects of deck penetrations and damage. Includes OSHA Subpart R.
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.

Survey Equipment Use and Care Two (10 Hours)
(Module ID 30209-11) 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.

Advanced Rigging (10 Hours)
(Module ID 30311-12) Describes the fabrication and uses of precast concrete elements and cast-in-place tilt-up wall systems. Focuses on rigging practices associated with these two distinct construction methods and the role of ironworkers in their installation.

Special Application Hoisting Devices (10 Hours)
(Module ID 30307-12) Explains techniques for rigging and moving equipment using a variety of hoisting devices, including gin poles, Chicago beams, A-frames, davits, balance beams, pump handles, high lines, caterpillar dollies, rollers. Also covers special cranes, including derricks, gantries, HILs, trolley cranes, and jacking frames.

Stud Welding (10 Hours)
Trainee $20  ISBN 978-0-13-292289-0
(Module ID 30303-12) Describes the equipment and methods used in flux core arc welding (FCAW). Includes proper selection and use of filler metals and shielding gases, as well as techniques for performing fillet and V-groove welding in various positions.

Pre-Engineered Systems (5 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 that apply to their installation and the safety precautions that apply to their installation and the safety precautions that apply to their installation and the safety precautions that apply to their installation and the safety precautions that apply to their installation and the safety precautions that apply to their installation and the safety precautions.

Miscellaneous/Ornamental Ironworking (5 Hours)
(Module ID 30316-12) Provides general information and procedures for the installation and attachment of gratings and checkered plate. Describes the rigging methods associated with the installation of trusses and curtain walls.

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Masonry

**LEVEL 1**

**MASONRY**

**MODULES**

- **Introduction to Masonry (12.5 Hours)**
  - Trainee $20
  - Module ID 28101-13: Covers basic masonry materials, tools, techniques, and safety precautions. Explains how to mix mortar by hand and lay masonry units. Also describes the skills, attitudes, and abilities of successful masons.

- **Masonry Safety (15 Hours)**
  - Trainee $20
  - Module ID 28106-13: Describes how to identify the common causes of accidents and the hazards associated with masonry tools, equipment, mortar, and concrete. Focuses on using personal protective equipment, working safely from elevated surfaces, properly using masonry tools and equipment, and handling masonry materials safely.

- **Masonry Tools & Equipment (15 Hours)**
  - Trainee $20
  - Module ID 28102-13: Describes a variety of hand tools, measuring tools, mortar equipment, power tools and equipment, and lifting equipment that masons use on the job, and explains how to use these tools correctly and safely. Provides instructions for assembling and disassembling scaffolds.

- **Measurements, Drawings, and Specifications (10 Hours)**
  - Trainee $20
  - Module ID 28103-13: Reviews the calculation of distances and areas common in masonry work; describes the information found on residential construction drawings; and explains the role of specifications, standards, and codes.

**MORTAR**

- **Trainee Guide: $20**
- Module ID 28104-13: Explains the types and properties of mortar and the materials used in the mixture, including admixtures; provides instructions for mixing mortar by machine; and describes how to properly apply and store mortar.

**Masonry Units and Installation Techniques (60 Hours)**

- **Trainee Guide: $20**
- Module ID 28105-13: Covers characteristics of block and brick rock; how to set up, lay out, and bond block and brick; how to cut block and brick; how to lay and tool block and brick; and how to clean block and brick once they have been laid. Describes masonry reinforcements and accessories used to lay block and brick professionally and safely.

**Advanced Laying Techniques (40 Hours)**

- **Trainee Guide: $20**
- Module ID 28205-14: Describes the construction of masonry wall systems, weep vents, and joints. Includes safety requirements and interaction with structural components.

**Effects of Climate on Masonry (20 Hours)**

- **Trainee Guide: $20**
- Module ID 28206-14: Describes materials and techniques used to apply insulation and methods of moisture control as they relate to the mason’s trade. Includes hot- and cold-weather considerations.

**Construction Inspection and Quality Control (15 Hours)**

- **Trainee Guide: $20**
- Module ID 28207-14: Introduces the quality control requirements for masonry construction. Presents procedures for inspection and testing of masonry materials and finished masonry construction.

**LEVEL 2**

**MASONRY**

**MODULES**

- **Residential Masonry (15 Hours)**
  - Trainee $20
  - Module ID 28201-14: Explains how to work with residential plans and construction drawings and convert that information into action on the job. Describes the organization and format of plans, dimensioning and scaling, and estimating materials quantities from information on the plans.

- **Advanced Laying Techniques (40 Hours)**
  - Trainee $20
  - Module ID 28201-14: Introduces types of masonry blocks and brick, and glass block. Describes the handling and construction of these materials, and introduces the intricacies of each.

**LEVEL 3**

**MASONRY**

**MODULES**

- **Specialized Materials and Techniques (60 Hours)**
  - Trainee $20
  - Module ID 28302-14: Introduces unique types of masonry situations that won’t be encountered on every job, including sound-barrier walls, arches, and the use of acid brick, refractory brick, and glass block. Describes the handling and construction of these materials, and introduces the intricacies of each.

- **Repair and Restoration (20 Hours)**
  - Trainee $20
  - Module ID 28303-14: Details techniques for identifying and repairing common masonry problems of weathering, settling, stain, etc. Explains tuckpointing, the removal of efflorescence and stains, and crack repair. Includes sections on how to repair foundation walls, water intrusion, and localized problems, as well as fireplace and chimney repair.
Masonry Level 3 (continued)

Commercial Drawings (25 Hours)
Trainee $20
(Module ID 28304-14) Explains how to read and identify drawings for commercial structures using previous experience from structural drawings as a baseline. Describes requirements for these drawings, as well as how to interpret and create plans for architectural, structural, and shop drawings.

Estimating (25 Hours)
Trainee $20
(Module ID 28305-14) Describes how to estimate building materials, such as brick, block, grout, mortar, joint reinforcement, and masonry ties. Details multiple methods for estimating, as well as how to estimate for masonry elements such as openings and lintels.

Site Layout — Distance Measurement and Leveling (20 Hours)
Trainee $20
(Module ID 28306-14) Covers the techniques needed to produce and read site plans and topographic maps. Describes the use of measuring devices such as tapes, range poles, plumb bobs, total stations, leveling instruments, and field notes. Also discusses the construction of batter boards and how to ensure correct measurements.

Stone Masonry (15 Hours)
Trainee $20
(Module ID 28308-14) Focuses on the application of natural stone in masonry construction. Describes types of stone and how stone is cut, finished, and stored. Discusses equipment and tools for handling stone. Details how to estimate and install stone using anchors and mortars and explains how to install stone veneers.

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Mechanical Insulating

**L1 MECHANICAL INSULATING**

**LEVEL 1**

**Curriculum Notes**

- 167.5 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, PowerPoint® and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK
Trainee Guide: $67
978-0-13-413099-6

**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.

- **Orientation to the Trade** (5 Hours)
  Trainee $20
  (Module ID 19010-18) 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 19014-18) 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 19015-18) 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) 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) 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.

- **Installing Fiberglass Pipe Insulation** (30 Hours)
  Trainee $20
  (Module ID 19106-18) Describes the characteristics of fiberglass pipe insulation and the characteristics of ASJ jacketing.

- **Insulating Pipe Fittings, Valves, and Flanges** (40 Hours)
  Trainee $20
  (Module ID 19107-18) Explains insulation requirements for fittings, valves, and flanges. Provides tips for professional and economical installation.

- **Contraction Drawings and Specifications** (12.5 Hours)
  Trainee $20
  (Module ID 19309) Describes how to determine the insulation requirements of a project by interpreting construction drawings.

- **Trade Math and Layout** (7.5 Hours)
  Trainee $20
  (Module ID 19212) Reviews some basic arithmetic and geometric concepts applicable to the mechanical insulating craft. Building on these basic skills, trainees then learn drafting and layout methods that they will frequently use throughout their careers.

- **Heat Transfer** (2.5 Hours)
  Trainee $20
  (Module ID 19303) Describes methods of heat transfer and moisture migration and discusses the application of various types of insulation to slow or prevent these processes.

- **Flexible Foam Insulation** (25 Hours)
  Trainee $20
  (Module ID 19201) Covers proper tool use and procedures for installing flexible foam insulation, including how to cut and install flexible foam insulation on pipe fittings, valves, flanges, equipment, and air ducts.

- **Air Duct Systems** (7.5 Hours)
  Trainee $20
  (Module ID 19302) Covers the identification of various duct systems and their associated components.

- **Blanket Insulation for Ducts** (7.5 Hours)
  Trainee $20
  (Module ID 19202) Covers fiberglass blanket installation to ducts and apparatus and discusses vapor-sealed blanket insulation facings.

- **Board Insulation for Ducts** (20 Hours)
  Trainee $20
  (Module ID 19203) 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.

**L2 MECHANICAL INSULATING**

**LEVEL 2**

**Curriculum Notes**

- 170 Hours
- Updated in 2018.

PAPERBACK
Trainee Guide: $97
978-0-13-416315-4

**MODULES**

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

- **Fundamentals of Crew Leadership** (20 Hours)
  Trainee $43
  (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.
Cements and Fabric Finishes  (10 Hours)  
Trainee $20  
(Module ID 19208) Covers the proper use of finishing tools, cleanup and protection procedures, and the limitations of cements, fabric finishes, and mastics.

Insulation Adhesives  (5 Hours)  
Trainee $20  
(Module ID 19304) Covers the identification, application, and use of adhesives.

Vapor Retarders and Insulation Coatings  (10 Hours)  
Trainee $20  
(Module ID 19211) Addresses the need to avoid the intrusion of water vapor into porous insulation and vapor retardant materials available to mechanical insulators. Trainees will also learn how to apply vapor-retardant mastics and membranes for common insulating scenarios.

Steam and Process Water Systems  (10 Hours)  
Trainee $20  
(Module ID 19305) Covers the identification of steam and condensate piping and describes steam and process water systems and their components.

Calcium Silicate/Expanded Perlite Pipe Insulation  (20 Hours)  
Trainee $20  
ISBN 978-0-13-498762-0  
(Module ID 19204) Discusses the safe handling and storage of calcium silicate pipe insulation, how to make accurate cuts, and how to install single- and double-layers of calcium silicate pipe insulation.

Rigid Foam and Cellular Glass Insulation  (12.5 Hours)  
Trainee $20  
(Module ID 19206) Covers the proper use of tools; handling and storage of rigid foam insulation; measuring, cutting, installing, and sealing rigid foam plastic and cellular glass insulation; cryogenic installation; expansion joints; contraction joints; and vapor stops.

Industrial Boiler Systems  (7.5 Hours)  
Trainee $20  
(Module ID 19306) Discusses boilers and related equipment, and their insulation requirements.

Mineral Wool Insulation  (12.5 Hours)  
Trainee $20  
(Module ID 19205) Describes how to measuring, cut, and score mineral wool insulation. Discusses attachments used on mineral wool, installation methods, sealing requirements, and how to use pin welding equipment.

Jacketing Systems  (12.5 Hours)  
Trainee $20  
(Module ID 19313) Discusses the purposes and the types of insulation jacketing available for mechanical systems. This module also explains how to work with various kinds of organic, polymeric, and other types of jacket not made from rigid sheet metal.

Jacketing Fabrication — Pipe and Fittings  (42.5 Hours)  
Trainee $20  
(Module ID 19310) Covers the identification and applications of pipes and pipe fittings and describes types of pipe and fitting jacketing, along with layout installation procedures and securements.

Jacketing Fabrication — Vessels and Equipment  (25 Hours)  
Trainee $20  
(Module ID 19311) Covers the identification of vessel and equipment jacketing, along with layout, fabrication, installation procedures, and securements.

Removable and Reusable Flexible Insulation Covers  (12.5 Hours)  
Trainee $20  
(Module ID 19314) Provides a detailed introduction to removable and reusable flexible insulation covers, and explains the construction and installation of commercially-fabricated and kit insulation covers.

Specialized Insulation Systems  (5 Hours)  
Trainee $20  
(Module ID 19308) Describes special-application insulation systems, including low-temperature and prefabricated panels; refractory insulation; soft pads and pre-shaped removable covers; preinsulated systems; spray, foam, and pour-in-place insulation; fire stops; noise and sound control systems; and cryogenic applications.

Fundamentals of Crew Leadership  (22.5 Hours)  
Trainee $45  
(Module ID 46101) The course covers basic leadership skills and explains different leadership styles, communication, delegating, and problem solving. Job safety and the crew leader’s role in safety are discussed, as well as project planning, scheduling, and estimating.

Millwright

L1  MILLWRIGHT  
LEVEL 1

Curriculum Notes

- Revised: 2006, Third Edition
- 147.5 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.)

PAPERBACK  ISBN

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

Orientation to the Trade  (5 Hours)  
Trainee $20  
(Module ID 15101-06) Presents the history of the trade and discusses career paths for millwrights. Describes environments and types of work associated with the millwright trade.

Millwright Hand Tools  (15 Hours)  
Trainee $20  
(Module ID 15102-06) Introduces hand tools used by millwrights. Explains hand tool safety and covers the methods for selecting, inspecting, using, and maintaining these tools.

Fasteners and Anchors  (10 Hours)  
Trainee $20  
(Module ID 15103-06) Identifies fasteners and anchors used by millwrights, including their applications and installation procedures.
Millwright Level 1 (continued)

Basic Layout (20 Hours)
Trainee $20  
Trainee Guide: $97  
ISBN 978-0-13-614641-4  
(Module ID 15201-07) Explains how to use tables of equivalents and conversion tables, figure ratios and proportions, perform right angle trigonometry, calculate takeouts using trigonometry, and calculate volumes and weights of objects.

Intermediate Blueprint Reading (20 Hours)
Trainee $20  
Trainee Guide: $97  
(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.

Field Sketching (10 Hours)
Trainee $20  
Trainee Guide: $97  
(Module ID 15203-07) Explains orthographic projection, isometric, and schematic drawings used to show piping, hydraulic, and pneumatic systems.

Precision Measuring Tools (20 Hours)
Trainee $20  
Trainee Guide: $97  
(Module ID 15206-07) Explains how to select, inspect and use leveling equipment, how to determine requirements and plan lifts, and how to communicate with crane operators.

Installing Belt and Chain Drives (10 Hours)
Trainee $20  
Trainee Guide: $97  
ISBN 978-0-13-614649-0  
(Module ID 15207-07) Explains procedures for setting machine basplates and soleplates, and aligning them with other equipment.

Installing Fans and Blowers (10 Hours)
Trainee $20  
Trainee Guide: $97  
(Module ID 15208-07) Explains how to safely select and use lubricants. Describes types of lubricants and lubrication devices.

Installing Mechanical Seals (20 Hours)
Trainee $20  
Trainee Guide: $97  
(Module ID 15209-07) Explains the types and applications of bearings, including plain, roller, ball, thrust and guide bearings, as well as pillow block, flanged, and takeup bearings. Also explains bearing designation systems.

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Trainee Guide: $97  
ISBN 978-0-13-614641-4  
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Trainee Guide: $97  
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Field Sketching (10 Hours)
Trainee $20  
Trainee Guide: $97  
(Module ID 15203-07) Explains orthographic projection, isometric, and schematic drawings used to show piping, hydraulic, and pneumatic systems.

Precision Measuring Tools (20 Hours)
Trainee $20  
Trainee Guide: $97  
(Module ID 15206-07) Explains how to select, inspect and use leveling equipment, how to determine requirements and plan lifts, and how to communicate with crane operators.

Installing Belt and Chain Drives (10 Hours)
Trainee $20  
Trainee Guide: $97  
ISBN 978-0-13-614649-0  
(Module ID 15207-07) Explains procedures for setting machine basplates and soleplates, and aligning them with other equipment.

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Intermediate Blueprint Reading (20 Hours)
Trainee $20  
Trainee Guide: $97  
(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.

Field Sketching (10 Hours)
Trainee $20  
Trainee Guide: $97  
(Module ID 15203-07) Explains orthographic projection, isometric, and schematic drawings used to show piping, hydraulic, and pneumatic systems.

Precision Measuring Tools (20 Hours)
Trainee $20  
Trainee Guide: $97  
(Module ID 15206-07) Explains how to select, inspect and use leveling equipment, how to determine requirements and plan lifts, and how to communicate with crane operators.

Installing Belt and Chain Drives (10 Hours)
Trainee $20  
Trainee Guide: $97  
ISBN 978-0-13-614649-0  
(Module ID 15207-07) Explains procedures for setting machine basplates and soleplates, and aligning them with other equipment.
Conveyors (5 Hours)
(Module ID 15401-08) Describes conveyor systems and their principles of operation.

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

Conventional Alignment (30 Hours)
(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)
(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)
(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)
(Module ID 15406-08) Introduces compressors and the troubleshooting and maintenance procedures associated with compressors.

Basic Pneumatic Systems (7.5 Hours)
(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)
(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)
(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)
(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)
(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)
(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)
(Module ID 15504-09) Explains how to use theodolites, optical levels, auto levels, and total stations to place and align equipment.

Turbines (20 Hours)
(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 (75 Hours)
(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)
(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)
(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 978-0-13-610646-0
(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.

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

ISBN 978-0-13-609960-4

LEVEL 5 MILLWORKING
Painting

L1 PAINTING - COMMERCIAL & RESIDENTIAL

Curriculum Notes
• 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.)
• Revised: 1997

PAPERBACK ISBN

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

CAREERS IN THE PAINTING TRADE (5 Hours)
(Module ID 07101) Presents a brief history of the painting trade. Covers career opportunities, from apprenticeship to managerial/business-related work. Describes the characteristics of the successful tradesperson, including productivity, appearance, personal hygiene, and dependability.

SAFETY (10 Hours)
(Module ID 07102) Provides an overview of construction site hazards and safety precautions for those in the painting trade. Covers methods of rigging and care of ladders, scaffolds, swing devices, and other equipment.

LADDERS, SCAFFOLDS, LIFTS, AND FALL PROTECTION (15 Hours)
(Module ID 07103) Covers methods of erecting, using and maintaining ladders, scaffolds, and lifts. Discusses fall protection equipment and safety practices used when working on ladders, scaffolds, and lifts.

IDENTIFYING SURFACE/ Substrate MATERIALS AND CONDITIONS (5 Hours)
(Module ID 07104) Explains how to identify types of surfaces used in construction including wood, metal, masonry/concrete, plaster/drywall and synthetic substrates. Also discusses how to identify new, aged, or previously coated surface conditions of substrates and coatings.

PROTECTING ADJACENT SURFACES (5 Hours)
(Module ID 07105) Describes the tools, materials, and methods used for protecting adjacent surfaces and areas prior to surface preparation, paint spraying, etc.

Basic Surface Preparation (15 Hours)
(Module ID 07106) Covers the tools, materials, and methods used for cleaning, repairing, and penetrating surfaces/substrates in preparation for coating. Describes basic methods used for surface preparation of wood, metal, plaster/drywall, cementitious, and synthetic surfaces/substrates.

SEALANTS AND REPAIR/FILLERS (5 Hours)
(Module ID 07107) Describes the characteristics of common sealants and fillers. Covers guidelines for selecting sealants/fillers and the tools and methods used to apply them to substrates.

INTRODUCTION TO PAINTS AND COATINGS (10 Hours)
(Module ID 07108) Describes the basic ingredients and film-forming processes common to all paints and coatings. Covers paint systems and functional categories of paints and coatings. Focuses on water-based alkyd paints and coatings.

BRUSHING AND ROLLING PAINTS AND COATINGS (15 Hours)
(Module ID 07109) Covers the types and selection of brushes, rollers, pads, mitts, and related accessories used for applying paints and coatings. Includes techniques used for brushing and rolling paints and coatings on an interior and exterior surfaces. Also recommends maintenance and storage methods.

Spray Painting (Conventional, Airless and HVLP) (25 Hours)
(Module ID 07210) Introduces the unique properties of high-performance coatings. Includes safety and health considerations, surface preparation, application, testing, and inspection.

Drywall Painting (5 Hours)
(Module ID 07209) Covers the materials and procedures used for drywall finishing and patching. Emphasizes techniques for finishing and patching drywall, including the use and care of tools, equipment and supplies, and safety.

Stains (7.5 Hours)
(Module ID 07207) Describes the different classes and/or kinds of stains, including their composition, selection for use, and application considerations.

Clear Finishes (7.5 Hours)
(Module ID 07208) Introduces the composition, uses, and application of clear finishes, including varnishes, lacquers, shellacs, and urethanes.

Wood Finishing (22.5 Hours)
(Module ID 07211) Covers the design and function of conventional, airless, and HVLP spraying equipment, including procedures for the safe operation and maintenance of typical equipment.

Painting Failures and Remedies Two (7.5 Hours)
(Module ID 07301) Explains how to recognize and remedy paint/coating failures caused by improper preparation and application of coatings, as well as coating discoloration.

Abrasive Blasting (7.5 Hours)
(Module ID 07205) Covers the basic design and function of abrasive blasting equipment, including general procedures for its use, related industry standards, and safety and health considerations.

Drywall Finishing and Patching (25 Hours)
(Module ID 07206) Covers the materials and procedures used for drywall finishing and patching. Emphasizes techniques for finishing and patching drywall, including the use and care of tools, equipment and supplies, and safety.

Stains (7.5 Hours)
(Module ID 07207) Describes the different classes and/or kinds of stains, including their composition, selection for use, and application considerations.

Clear Finishes (7.5 Hours)
(Module ID 07208) Introduces the composition, uses, and application of clear finishes, including varnishes, lacquers, shellacs, and urethanes.

Wood Finishing (22.5 Hours)
(Module ID 07211) Covers the design and function of conventional, airless, and HVLP spraying equipment, including procedures for the safe operation and maintenance of typical equipment.

Painting Failures and Remedies Two (7.5 Hours)
(Module ID 07301) Explains how to recognize and remedy paint/coating failures caused by improper preparation and application of coatings, as well as coating discoloration.
Painting Level 3 (continued)

Job Supervision, Planning, and Control
(15 Hours)
Trainee $20
(Module ID 07302) Covers skills and leadership traits associated with the successful supervisor, including how to supervise and motivate employees, how to estimate a job, the use of contract documents, and methods for controlling materials and tools/equipment.

Coatings Three (15 Hours)
Trainee $20
ISBN 978-0-13-875105-0
(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
ISBN 978-0-13-875121-0
(Module ID 07305) Describes techniques for glazing, antiquing, stippling, mottingling, 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.

Spraying with Special Devices (20 Hours)
Trainee $20
(Module ID 07309) Covers the design and function of texture, cold roof coating, electrostatic, and plural component spraying equipment. Includes procedures for the safe operation and maintenance of typical equipment.

The Painting Level 4 curriculum has been discontinued. The Industrial Coating and Application Specialist curriculum may be used instead. See p. 32.
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.

LEVEL 4

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 spool 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, lateral, 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.

LEVEL 3

PAPERBACK ISBN
Trainee Guide: $97
978-0-13-227284-1

LEVEL 4

PAPERBACK ISBN
Trainee Guide: $97
978-0-13-614429-8

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To Order Call: 1-800-922-0579
Introduction to Supervisory Roles (7.5 Hours)
Trainee $20  ISBN 978-0-13-015305-0
(Module ID 24102) Describes the safe use, care, and maintenance of pipelayer hand and power tools. Discusses methods for operating and maintaining dewatering equipment, generators, and compressors. Contains an introduction to elevations as it relates to the setup of these instruments. Describes common causes and solutions to laser problems in the field.

Trench Safety (7.5 Hours)
(Module ID 24107) Discusses soil behavior as it relates to trench failures, including common indications of an unstable trench. Introduces typical shoring, shielding, and sloping methods. Identifies characteristics that may make a trench a confined space and describes the safety measures needed to work in the trench.

Foundation Stabilization, Bedding, and Dewatering (7.5 Hours)
(Module ID 24108) Discusses methods for preparing the trench for pipe installation, including stabilization, bedding, and initial backfill. Describes effective methods for dewatering a trench and includes a section on troubleshooting dewatering equipment.

Testing Pipe (12.5 Hours)
(Module ID 24109) Discusses methods for preparing pressure and gravity systems for testing, including cleaning and inspecting pipe systems. Describes methods for testing pressure and gravity systems, including vacuum testing of concrete manholes.

Hot Taps (10 Hours)
(Module ID 08407-07) Explains the mechanics of attaching fittings to the pipeline while the line is under pressure. Covers line stopping, freeze stopping, and adding connections to the line.

Maintaining Valves (10 Hours)
Trainee $20  ISBN 978-0-13-604794-0
(Module ID 08408-07) Explains how to replace packing and O-rings, and how to open and close a valve’s bonnet. Discusses how to safely troubleshoot and maintain several types of valves.

L1 PIPELAYER

Curriculum Notes
- 185 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.)
- Published: 1999
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

Trainee Guide: $67  978-0-13-014258-0

MODELS
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)
(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 (22.5 Hours)
(Module ID 24104) Discusses practical methods for safely cutting common pipe materials. Describes pipe materials and standard sizes for thermoplastic, concrete, ductile iron, and corrugated steel pipe.

Gaskets, Joints, and Fittings (20 Hours)
(Module ID 24105) Discusses methods for joining PVC, ductile iron, and concrete pipe, including O-ring pipe, slip joints, mechanical joints, and restraint joints. Discusses methods for joining pipe to pipe, pipe to appurtenances, and pipe to manhole connections, including transition couplings.

Introduction to Elevations (5 Hours)
(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
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.
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 plastic 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-spiqot 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 systems.

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 Safety (22.5 Hours)
Trainee $20
(Module ID 02102-12) Discusses the causes of accidents and their consequences including delays, increased expenses, injury, and loss of life. Reviews the types and proper use of personal protective equipment (PPE). Explains the use of critical safety information including HazCom, safety signs, signals, lockout/ tagout, and emergency response. Covers confined-space safety, and reviews safety issues related to hand and power tools.

Tools of the Plumbing Trade (10 Hours)
Trainee $20
(Module ID 02103-12) Describes the care and use of hand and power tools. Trainees will use on the job. Explains how to select the appropriate tools for different tasks, and reviews tool maintenance and safety issues.

Introduction to Plumbing Math (12.5 Hours)
Trainee $20
(Module ID 02104-12) Reviews basic math concepts, such as whole numbers, fractions, decimals, and squares, and demonstrates how they apply to on-the-job situations. Explains how to measure pipe using fitting tables and framing squares and how to calculate 45-degree offsets.

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.
Installing and Testing Water Supply Piping (20 Hours)
(Module ID 02206-13) Reviews proper techniques for locating, installing, and testing complete water service and distribution systems, including meters, water heaters, water softeners, and hose bibs. Introduces basic backflow and water hammer prevention, and discusses the installation of shower and tub valves, ice maker and washing machine boxes, and pipestubouts and supports.

Types of Valves (5 Hours)
(Module ID 02207-13) Reviews types of valves, their components, and applications. Also covers valve servicing.

Fixing and Testing Valves (20 Hours)
(Module ID 02208-13) Covers the installation of basic plumbing fixtures, including bathtubs, shower stalls, lavatories, sinks, water closets, and urinals. Reviews the installation of associated valves, faucets, and components. Explains how to connect appliances such as dishwashers, food-waste disposers, refrigerators and ice makers, and washing machines.

Installing Water Heaters (10 Hours)
(Module ID 02209-13) Discusses gas-fired, electric, tankless, heat pump, and indirect water heaters, components, and applications. Reviews proper installation and testing techniques and covers the latest code requirements for water heaters.

Basic Electricity (10 Hours)
(Module ID 02210-13) Introduces electrical safety and the principles of electricity including voltage, current, resistance, and power. Includes important electrical formulas, circuitry, and common plumbing-related electrical applications.

Fuel Gas and Fuel Oil Systems (20 Hours)
(Module ID 02211-13) Introduces techniques for safe handling of natural gas, liquified petroleum gas, and fuel oil. Reviews fuel gas and fuel oil safety precautions and potential hazards, applications, systems installation, and testing.

Applied Math (17.5 Hours)
(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)
(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)
(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)
(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)
(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)
(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)
(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)
(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)
(Module ID 02311-14) Covers the troubleshooting and repair of fixtures, valves, and faucets in accordance with code and safety guidelines. Explains 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.

L4 PLUMBING

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

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

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.

Business Principles for Plumbers (15 Hours)
(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)
(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)
(Module ID 02403-14) Builds on trainees’ 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)
(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)
(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)
(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.

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Plumbing Level 4 (continued)

Private Water Supply Well Systems (10 Hours)
(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)
(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.

Swimming Pools and Hot Tubs (7.5 Hours)
(Module ID 02410-14) Introduces trainees to plumbing systems in swimming pools, hot tubs, and spas.

Plumbing for Mobile Homes and Travel Trailer Parks (7.5 Hours)
(Module ID 02411-14) Describes the location and layout of plumbing systems for mobile home and travel trailer parks. Reviews how to design and lay out a system, how to connect water and sewer lines to a mobile home, and how to estimate materials for the park.

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Curriculum Notes

• 190 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.)
• Published: 2005
• 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.

PAPERBACK  ISBN  978-0-13-228220-8
Trainee Guide: $67

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 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)
(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.

Swimming Pools and Hot Tubs (7.5 Hours)
(Module ID 02410-14) Introduces trainees to plumbing systems in swimming pools, hot tubs, and spas.

Plumbing for Mobile Homes and Travel Trailer Parks (7.5 Hours)
(Module ID 02411-14) Describes the location and layout of plumbing systems for mobile home and travel trailer parks. Reviews how to design and lay out a system, how to connect water and sewer lines to a mobile home, and how to estimate materials for the park.

Private Water Supply Well Systems (10 Hours)
(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)
(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.

Reinforcing Ironwork

Rigging Equipment (10 Hours)
(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)
(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)
(Module ID 39105-05) Explains the format and content of drawings typically found in a commercial drawings package.

Oxyfuel Cutting (17.5 Hours)
(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)
(Module ID 27204-01) Covers the construction of forms for continuous, stepped continuous, pier and grade beam concrete footings. Describes the edge forms used for on-grade concrete slabs and similar structures. Forming terms, parts of forms and procedures for constructing basic footing and edge forms are included.

Concrete Forms (32.5 Hours)
(Module ID 27205-01) Covers the applications and construction methods for various types of job-built forms, including wall, column, slab-and-beam, and stair forms. Instructor’s Guide includes instruction sheets for construction of various forms.

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

Manufactured Forms (22.5 Hours)
(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)
(Module ID 30116) Identifies decking types and profiles and how decking is packaged, shipped, and stored. Describes erecting decking and placing concrete safely. Explains the effects of deck penetrations and damage.

Introductory Skills for the Crew Leader (16 Hours)
(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.
Scaffolding

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.

Introduction to the Trade (7.5 Hours)
Trainee $20
(Module ID 31101-15) Introduces the scaffolding program, describes the duties of a scaffold, 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 (7.5 Hours)
Trainee $20
(Module ID 31104-15) Explains and gives examples of math calculations of scaffold loads, including area loads, concentrated loads, live loads, cantilevered loads, and wind loads.

Supported Scaffolds (32.5 Hours)
Trainee $20
ISBN 978-0-13-378899-0
(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

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 04104-08) 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.

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.

Installation of Ductwork (15 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.

Introduction to Sheet Metal Trade (5 Hours)
Trainee $20
(Module ID 04101-08) Summarizes the history and development of the sheet metal trade. Explains the benefits of apprenticeship training, and identifies career opportunities in the trade.

Trade Math One (20 Hours)
Trainee $20
ISBN 978-0-13-604835-0
(Module ID 04104-08) Builds on trainees’ basic math skills to solve trade-related problems. Covers calculations using denominate numbers, area and volume calculations, English-metric system conversions, basic geometry, and calculation of stretchouts.

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.

Suspension Scaffolds (7.5 Hours)
Trainee $20
(Module ID 31101-15) Introduces the scaffolding program, describes the duties of a scaffold, and identifies scaffold types and scaffolding terms.
Sheet Metal Level 1 (continued)

**Insulation** (7.5 Hours)
Trainee $20
(Module ID 04108-08) Describes how to install fiberglass blanket, foam, and pipe insulation using approved adheres and fastening techniques. Also includes the fabrication and installation of fitting covers and preformed fitting covers.

**Architectural Sheet Metal** (15 Hours)
Trainee $20
(Module ID 04109-08) Teaches how to lay out and fabricate sheet metal components of a roof drainage system, including flashing, gutters, and downspouts.

**Air Properties and Distribution** (15 Hours)
Trainee $20
(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)
Trainee $20
(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 bend allowance.

**Soldering** (15 Hours)
Trainee $20
(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
(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)
Trainee $20
(module ID 04209-08) Describes fiberglass duct layout and fabrication methods. Also discusses closure, hanging, and support methods. Explains how to repair minor and major damage to fiberglass duct.

**Fabrication Three – Triangulation** (15 Hours)
Trainee $20
(module ID 04307-09) Provides trainees with the opportunity to practice layout, fabrication, and installation of various architectural pieces.

**Advances Architectural Sheet Metal** (12.5 Hours)
Trainee $20
(module ID 04308-09) 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)
Trainee $20
(module ID 04309-09) Provides a case-study approach to learning how to read 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.

**Principles of Airflow** (22.5 Hours)
Trainee $20
(module ID 04310-09) 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.

**Advanced Architectural Sheet Metal** (12.5 Hours)
Trainee $20
(module ID 04307-09) Provides trainees with the opportunity to practice layout, fabrication, and installation of various architectural pieces.

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**Curriculum Notes**

- **LEVEL 2**
  - **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**


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**Curriculum Notes**

- **LEVEL 3**
  - **157.5 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**


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**Curriculum Notes**

- **LEVEL 4**
  - **150 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**


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**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)
Trainee $20
(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 measurement problems.

**Plans and Specifications** (20 Hours)
Trainee $20
(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** (55 Hours)
Trainee $20
(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 demonstrate their skills.

**Sheet Metal Duct Fabrication Standards** (7.5 Hours)
Trainee $20
(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.

**Trade Math Three – Field Measuring and Fitting** (15 Hours)
Trainee $20
ISBN 978-0-13-610511-4
(module ID 04301-09) Describes the techniques used for field measuring and layout of ducts and fittings. Also provides practice in solving field measuring problems.

**Air Systems** (10 Hours)
Trainee $20
(module ID 04302-09) Reviews the operating principles, components, and applications of common air systems. Discusses constant volume systems, variable volume systems, variable temperature (VVT) systems, variable air volume (VAV) systems, and dual VAV systems.

**Shop Production and Organization** (15 Hours)
Trainee $20
(module ID 04401-09) Introduces the production, 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)
Trainee $20
(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)
Trainee $20
(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)
Trainee $20
(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)
Trainee $20
(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.

Survey Equipment Use and Care One (30 Hours)
Trainee $20
(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)
Trainee $20
(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, EDMIs and Total Stations (10 Hours)
Trainee $20
(Module ID 78202-04) Covers the setup, use, calibration, and care of electronic distance measuring instruments and total stations.

Control Setup (30 Hours)
Trainee $20
(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)
Trainee $20
(Module ID 78204-04) Contains information and instructions for gathering, recording, and plating 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)
Trainee $20
(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)
Trainee $20
(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, embedments, and stairs.

Introductory Supervisory Skills (20 Hours)
Trainee $20
(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.

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Copper Tube Systems (10 Hours)
Trainee $20
(Module ID 18015-13) 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. Support brazing for copper tube and grooved couplings for copper pipe are also discussed.

Underground Pipe (17.5 Hours)
Trainee $20
(Module ID 18016-13) 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.

Wet Fire Sprinkler Systems (25 Hours)
Trainee $20
(Module ID 18207-13) Explains the purpose, function, and operation of wet pipe system components. Describes riser check valves, alarm check valves, and trim; flow, tamper, and pressure switches; fire department connections and hose stations; antifreeze systems; faulty pressure gauges; inspector’s test connections and auxiliary drains; and hydrostatic testing and test pumps.

Dry-Pipe Systems (25 Hours)
Trainee $20
(Module ID 18207-13) Explains the purpose, function, and operation of components used in a dry-pipe system. Describes how to install pressure gauges on alarm valves and accelerators, how to set and adjust an air maintenance device, and how to reset and troubleshoot dry-pipe systems.

Standpipes (25 Hours)
Trainee $20
(Module ID 18302-13) Describes standpipe classifications and explains installation techniques and troubleshooting. Covers hydraulic and pneumatic release mechanisms, non-interlocked and interlocked preaction systems and Firecycle® Systems.

Water Supplies (15 Hours)
Trainee $20
(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.

**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.

**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.

**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.

**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.

**Plastic 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.
Welding Level 1 (continued)

Air-Carbon Arc Cutting and Gouging (10 Hours)
Trainee $20
ISBN 978-0-13-418202-4
(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 and use 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
ISBN 978-0-13-418025-0
(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 plates 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, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

Hardcover
Trainee Guide: $97

Paperback
Trainee Guide: $97

NCCERConnect Access Card: $97

NCCERConnect + Hardcover Trainee Guide: $124

NCCERConnect + Paperback Trainee Guide: $122

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 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.

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 1E, 2E, 3E, and 4E positions.

Curriculum Notes
- 470 Hours (370 Required; 100 Elective/Optional)
- Revised: 2016, Fifth Edition
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

Paperback
Trainee Guide: $97

NCCERConnect Access Card: $97

NCCERConnect + Trainee Guide: $122

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.

SMAW – Groove Welds with Backing (Module ID 29201-15) Describes how to make groove welds on carbon steel plate in various positions. Explains how to make multiple-pass fillet and V-groove welds on carbon steel plate in various positions.

SMAW – Open-Root Groove Welds – Plate (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.

SMAW – Open-Root Pipe Welds (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, 2E, 3E, and 4G positions.
Welding Level 3 (continued)

GMAW – Pipe (60 Hours)
(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.

SMAW – Stainless Steel Plate and Pipe Groove Welds (100 Elective Hours)
(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 – Low Alloy and Stainless Steel Pipe (70 Hours)
(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 – Aluminum Pipe (50 Hours)
(Module ID 29303-16) Covers the setup of GTAW equipment for welding aluminum pipe. Explains how to clean and prepare aluminum pipe 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.

GCW – Aluminum Plate (30 Hours)
(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.

Soldering and Brazing (12.5 Hours)
(Module ID 29402-16) Covers the setup of GTAW equipment for welding aluminum plate. 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 – Aluminum Plate (30 Hours)
(Module ID 29402-16) Covers the setup of GTAW equipment for welding aluminum plate. 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)
(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.

FCAW – Pipe (60 Hours)
(Module ID 29306-16) 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.

GCW – Aluminum Pipe (50 Hours)
(Module ID 29303-16) Covers the setup of GTAW equipment for welding aluminum pipe. Explains how to clean and prepare aluminum pipe 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.

GTAW – Aluminum Pipe (50 Hours)
(Module ID 29303-16) Covers the setup of GTAW equipment for welding aluminum pipe. Explains how to clean and prepare aluminum pipe 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 (12.5 Hours)
(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.

GTAW – Aluminum Plate (30 Hours)
(Module ID 29402-16) Covers the setup of GTAW equipment for welding aluminum plate. 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 – Aluminum Plate (30 Hours)
(Module ID 29402-16) Covers the setup of GTAW equipment for welding aluminum plate. 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 – Aluminum Pipe (50 Hours)
(Module ID 29303-16) Covers the setup of GTAW equipment for welding aluminum pipe. Explains how to clean and prepare aluminum pipe 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 (12.5 Hours)
(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.
MOBILE CRANE OPERATIONS

LEVEL 1

NEW!

Curriculum Notes

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

PAPERBACK
Trainee Guide: $67

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.

Orientation to the Trade (5 Hours)
Trainee $20
(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.

Basic Principles of Cranes (15 Hours)
Trainee $20
(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.

Rigging Practices (15 Hours)
Trainee $20
(Module ID 21102; from Basic Rigger)

Crane Communications (10 Hours)
Trainee $20
(Module ID 21104; from Signal Person)

Crane Safety and Emergency Procedures (25 Hours)
Trainee $20
(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.

Operating a Crane (25 Hours)
Trainee $20
(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.

LEVEL 2

NEW!

Curriculum Notes

- 145 Hours
- Updated in 2018.
- 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.

Machine Power Flow (15 Hours)
Trainee $20
(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.

Computer Aids/Operator Aids (20 Hours)
Trainee $20
(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.

Wire Rope (25 Hours)
Trainee $20
(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.

Mobile Crane Maintenance and Inspections (25 Hours)
Trainee $20
(Module ID 21203) Covers the types of inspections typically performed on mobile cranes. Describes service requirements for crane maintenance.

Load Dynamics (17.5 Hours)
Trainee $20
(Module ID 21206) Covers leverage, forward and backward stability, operational quadrants, submerged lifts, non-centered lifts, and other forces that affect stability.

Transporting Requirements (17.5 Hours)
Trainee $20
(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.

On-Site Equipment Movement (25 Hours)
Trainee $20
(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.

LEVEL 3

NEW!

Curriculum Notes

- 145 Hours
- Updated in 2018.
- 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.

Load Charts (35 Hours)
Trainee $20
(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.

Lift Planning (30 Hours)
Trainee $20
(Module ID 21304) Discusses lift plan implementation, including reference information, calculations, single- and multiple-crane lifting, critical lifts, and engineering considerations.

Telescopic Boom Attachment Setup and Assembly (20 Hours)
Trainee $20
(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.

Lattice Boom Assembly and Disassembly (20 Hours)
Trainee $20
(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.

Hoisting Personnel (20 Hours)
Trainee $20
(Module ID 21305) Examines ASME B30.23 and 29 CFR 1926.550(g) requirements while presenting advanced operation techniques for hoisting personnel.

Advanced Operational Techniques (20 Hours)
Trainee $20
(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.
## BASIC RIGGER
### Curriculum Notes
- 137.5 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.)
- Updated in 2018.
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.
- A Spanish translation of Rigging Fundamentals is available. Please see NCCER’s online catalog for more information.

### 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
- (Module ID 21106; from Mobile Crane Operations Level One) 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)

#### 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
- 105 Hours
- Updated in 2018.
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

### 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)

#### Lift Planning (20 Hours)
- Trainee $20
- (Module ID 21304; from Mobile Crane Operations Level Three)

## ADVANCED RIGGER
### Curriculum Notes
- 95 Hours
- Updated in 2018.
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

### 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 receive 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)

#### Wire Rope (25 Hours)
- Trainee $20
- (Module ID 21204; from Mobile Crane Operations Level Two)

#### Telescopic Boom Attachment Setup and Assembly (20 Hours)
- Trainee $20
- (Module ID 21302; from Mobile Crane Operations Level Three)

#### Lattice Boom Assembly and Disassembly (25 Hours)
- Trainee $20
- (Module ID 21306; from Mobile Crane Operations Level Three)

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

#### Crane Communications (10 Hours)
- Trainee $20
- (Module ID 21102; from Mobile Crane Operations Level One)

#### Basic Principles of Cranes (15 Hours)
- Trainee $20
- (Module ID 21102; from Mobile Crane Operations Level One)

#### 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)

#### Lift Planning (20 Hours)
- Trainee $20
- (Module ID 21304; from Mobile Crane Operations Level Three)

## SIGNAL PERSON
### Curriculum Notes
- 50 Hours
- Updated in 2018.
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

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

#### Crane Communications (25 Hours)
- Trainee $20
- (Module ID 21106; from Mobile Crane Operations Level One)
To Order Call: 1-800-922-0579

Alternative Energy

Nuclear Power (25 Hours)
(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 Power (25 Hours)
(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 PV applications.

Wind Power (22.5 Hours)
Trainee S20 ISBN 978-0-13-272939-0
(Module ID 74105-11) Describes wind power and how it is harnessed. Identifies the advantages and disadvantages of wind energy. Discusses the past, present, and future of wind energy, as well as wind energy applications.

Orientation to the Trade (5 Hours)
(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)
(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)
(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)
(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.

Load Charts (15 Hours)
(Module ID 48105-10) Explains how to use load charts to calculate safe lifting capacities for self-erecting, luffing boom, and hammerhead tower cranes. Also covers parts of line and counterweight configurations.

Communications (10 Hours)
(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.

Operating a Tower Crane (25 Hours)
Trainee S20 ISBN 978-0-13-213826-0
(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.

Tower Crane Operator

Modules

L1 TOWER CRANE OPERATOR

PAPERBACK ISBN
Trainee Guide: $67 978-0-13-213720-1

Curriculum Notes
- 177.5 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.)
- Published: 2010
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

M O D U L E S
All of the modules below are included in the Trainee Guide. The following ISBN and pricing information is for ordering individual modules only.

Module ID 74101-11:
Introduction to Alternative Energy (25 Hours)
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.

Module ID 74102-11:
Biomass and Biofuels (22.5 Hours)
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.

Module ID 74103-11:
Nuclear Power and its Sources (25 Hours)
Describes nuclear power and its sources. Discusses the advantages and disadvantages of nuclear power, the future of nuclear energy, and nuclear power generation.

Module ID 74104-11:
Solar Power (22.5 Hours)
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 PV applications.

Module ID 74105-11:
Wind Power (25 Hours)
Trainee S20 ISBN 978-0-13-272939-0
Describes wind power and how it is harnessed. Identifies the advantages and disadvantages of wind energy. Discusses the past, present, and future of wind energy, as well as wind energy applications.
Solar Photovoltaics

**L1 SOLAR PHOTOVOLTAIC SYSTEMS INSTALLER**

**MODULES**

- **217.5 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.)**
- **Published: 2011**
- **Developed using NABCEP's PV Task Analysis and aligned with NABCEP's PV Installer Certification.**
- **Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.**
- **Introduction to Solar Photovoltaics (Module ID 57101-10) has been approved for 40 general continuing education credit hours under GBCI's Credential Maintenance Program.**
- **NCCER is a recognized accrediting body for institutions to become providers of the NABCEP Entry Level Exam.**
- **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.**

**Introduction to Solar Photovoltaics (40 Hours)**

Trainee S20  
(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  
(Module ID 57102-11)  
ISBN 978-0-13-266202-4  
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 wiring. 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.

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**Sustainable Construction**

**Sustainable Construction Supervisor**

- **20 Hours**  
  - **Published: 2011**  
  - **Module ID 70201-11**

**PAPERBACK**  
Trainee Guide: $53  

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

Sustainable Construction Supervisor provides front-line supervisors with sustainable construction management techniques as they relate to targeted construction-phase LEED points for their projects. Topics include project sustainability goals, Green building materials and technologies, Green building methods and processes, and more.

**Your Role in the Green Environment**

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

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

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

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 PowerPoints® 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**

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, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

**FUNDAMENTALS OF WEATHERIZATION**

- 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.

**LEVEL 1 WEATHERIZATION TECHNICIAN**

- 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, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

**LEVEL 2 WEATHERIZATION CREW CHIEF**

- 162.5 Hours
- Published: 2011
- Downloadable instructor resources that include module tests, PowerPoints®, 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**


**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)

- **Thermal & Moisture Protection**
  - 7.5 Hours
  - (Module ID 27203-07; from Carpentry Level Two, Fourth Edition)

- **Concrete and Steel Construction Methods**
  - 12.5 Hours
  - (Module ID 33103-10; from Electronic Systems Technician Level One)

**Sealing the Building Envelope**

- 25 Hours
- (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 caulks and other materials. Also explains how to patch drywall and install weatherstripping.

- (10 Hours)

**Insulating Pipes, Ducts, and Water Heaters**

- 17.5 Hours
- (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.

- (12.5 Hours)

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

Commercial Drawings (25 Hours)
(Module ID 27201-07; from Carpentry Level Two, Fourth Edition)

Introduction to Supervisory Skills (15 Hours)
(Module ID 03410-09; from HVAC Level Four, Third Edition)

Introduction to Cooling (30 Hours)
(Module ID 03107-07; from HVAC Level One, Third Edition)

Introduction to Heating (15 Hours)
(Module ID 03108-07; from HVAC Level One, Third Edition)

Chimneys, Vents, and Flues (5 Hours)
(Module ID 03202-07; from HVAC Level Two, Third Edition)

Air Distribution Systems (10 Hours)
(Module ID 03109-07; from HVAC Level One, Third Edition)

Air Quality Equipment (5 Hours)
(Module ID 03204-07; from HVAC Level Two, Third Edition)

Indoor Air Quality (15 Hours)
(Module ID 03403-09; from HVAC Level Four, Third Edition)

Diagnostics and Management Practices (30 Hours)
(Module ID 59201-10) Explains how to interpret energy audit reports and how to prioritize and schedule air sealing. Describes how to perform the following tests: blower door, pressure pan, burner efficiency, carbon monoxide, draft, and spillage. Also covers lead-safe work practices and how to perform quality inspections on completed work.

L2 BUILDING AUDITOR

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)

Introduction to Cooling (30 Hours)
(Module ID 03107-07; from HVAC Level One, Third Edition)

Introduction to Heating (15 Hours)
(Module ID 03108-07; from HVAC Level One, Third Edition)

Chimneys, Vents, and Flues (5 Hours)
(Module ID 03202-07; from HVAC Level Two, Third Edition)

Wind Energy

L1 WIND TURBINE MAINTENANCE

TECHNICIAN

LEVEL 1

GBCI

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

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)
(Module ID 58101-11) Introduces the fundamentals of generating electrical power from wind energy. A brief history of wind energy is included as well as wind science, the interception of wind energy through a rotor, and an identification of major wind turbine generator components.

Introduction to Hydronic Systems (10 Hours)
(Module ID 03203-07; from HVAC Level Two, Third Edition)

Heating and Cooling System Design (25 Hours)
(Module ID 03407-09; from HVAC Level Four, Third Edition)

Energy Conservation Equipment (10 Hours)
(Module ID 03404-09; from HVAC Level Four, Third Edition)

Indoor Air Quality (15 Hours)
(Module ID 03403-09; from HVAC Level Four, Third Edition)

Alternative Heating and Cooling Systems (10 Hours)
(Module ID 03409-09; from HVAC Level Four, Third Edition)

Performing a Building Audit (42.5 hours)
(Module ID 59202-10) Explains how to interview homeowners and educate them about saving energy in their homes. Explains how to inspect and evaluate the building envelope and HVAC systems. Describes how to perform the following tests: blower door, pressure pan, burner efficiency, carbon monoxide, draft, and spillage. Also covers lead-safe work practices and how to perform quality inspections on completed work.

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

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 32207-07; from Industrial Maintenance Mechanic Level Two)

Lubrication (12.5 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.

Project Supervision

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 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.
PROJECT MANAGEMENT

Curriculum Notes

- 115 Hours
- A companion DVD with scenarios and a user’s guide is available for purchase. See “Management DVD” for ordering details.
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK

Participant Guide: $98

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) 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 (15 Hours)**
Participant $20
(Module ID 44102-08) 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
ISBN 978-0-13-603845-0
(Module ID 44103-08) 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
(Module ID 44104-08) 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
(Module ID 44105-08) 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
(Module ID 44106-08) 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
(Module ID 44107-08) 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
(Module ID 44108-08) 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) 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
(Module ID 44110-08) Defines quality control and quality assurance, and stresses management’s concerns 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
(Module ID 44111-08) 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.

**Management DVD**

Minor Decisions: Major Impact; How to Deal with Real Issues in Project Management
Published: 2009
DVD: $100
Looking for a way to stimulate class discussions about management topics? NCCER’s DVD, Minor Decisions: Major Impact, provides example scenarios of issues commonly encountered by construction managers. Participants are prompted to consider how they would apply techniques they’re learning in the classroom to these real-life, on-the-job situations. Instructional materials and recommended solutions are included.

For more information or to see a clip of the video, visit www.nccer.org.
**Maritime Industry Fundamentals**

250,000. That’s not just a number needed to fill the jobs created by workers leaving the building and plant construction industry. It’s the number of men and women leaving jobs in shipbuilding, shipyards, ship repair facilities, and offshore rigs – the maritime industry. This industry is facing a skilled workforce crisis due to an aging workforce and dwindling pool of workers from which to draw. In partnership with the NMEC (National Maritime Education Council), NCCER has developed the first ever standardized and nationally recognized Maritime curricula. This program includes training material in Maritime ‘Core’ and Pipefitter, and Structural Fitter, and will soon be followed by assessments to certify journey-level skills.

**Introduction to the Maritime Industry**

12.5 Hours
Published: 2013
Module ID 84101-13

**PAPERBACK**
ISBN
Trainee Guide: $22
978-0-13-295443-3

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

Introduces the facilities, methods, and processes used in the shipbuilding and repair industry. Describes the impact the industry has on the U.S. economy and explores the various craft opportunities available to workers. Provides an overview of the safety practices specific to the industry.

**Maritime Pipefitting**

**Maritime Pipefitting Trade Math** (15 hours)
Trainee S20
ISBN 978-0-13-340591-0

(Module ID 85102-13) Explains how to solve a wide variety of maritime pipefitter 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 S20

(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 S20
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 S20

(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, bevelling, washing, and gouging are reviewed. Oxyfuel gas supply arrangements from both cylinders and manifold are also presented.

**Ladders and Scaffolds** (12.5 hours)
Trainee S20

(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 S20

(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.

Fiberglass and Plastic Pipe Fabrication
Trainee $20
(Module ID 85207-13) 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.

Weld Quality (10 Hours)
Trainee $20
(Module ID 85208-13) Introduces various types of fiberglass and plastic pipe and their maritime applications. Explains how fiberglass and plastic piping materials are measured, cut, and joined.

Welding Safety (2.5 Hours)
Trainee $20
(Module ID 85209-13) 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.

Introduction to Structural Fitter Drawings (10 Hours)
Trainee $20
(Module ID 85210-13) 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.

Intermediate Structural Print Reading (10 Hours)
Trainee $20
(Module ID 85211-13) 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.

Intermediate Structural Print Reading (40 Hours)
Trainee $20
(Module ID 85212-13) 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.

Intermediate Structural Print Reading (40 Hours)
Trainee $20
ISBN 978-0-13-334061-0
(Module ID 85213-13) 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.

Tack Welding (40 Hours)
Trainee $20
(Module ID 85214-13) 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.

Tack Welding (40 Hours)
Trainee $20
(Module ID 85215-13) 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.

Tack Welding (40 Hours)
Trainee $20
(Module ID 85216-13) 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.

Tack Welding (40 Hours)
Trainee $20
(Module ID 85217-13) 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.

Tack Welding (40 Hours)
Trainee $20
(Module ID 85218-13) 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.
Maritime Structural Fitter Level 3

**Curriculum Notes**

- 237.5 Hours
- Published: 2016
- downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

**PAPERBACK**
Trainee Guide: $97
978-0-13-457826-2

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

- **Advanced Structural Print Reading** (40 Hours)
  Trainee $20
  ISBN 978-0-13-414487-0
  (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)
  Trainee $20
  (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)
  Trainee $20
  (Module ID 29205-09; from Welding Level Two, Fourth Edition)

- **GMAW and FCAW – Plate** (80 Hours)
  Trainee $20
  (Module ID 29206-09; from Welding Level Two, Fourth Edition)

- **Fundamentals of Crew Leadership** (20 Hours)
  Trainee $43
  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. Job site 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, PowerPoints® 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 Mechanical

Pipeline Maintenance

Pipeline Electrical and Instrumentation

Pipeline Corrosion Control

Level 3: Craft-Specific Training with Operator Qualification

Pipeline Operations Technician

Pipeline Mechanical Technician

Pipeline Maintenance Technician

Pipeline Electrical and Instrumentation Technician

Pipeline Corrosion Technician

Trained and Qualified Pipeline Professional Credential
Introduction to the Pipeline Industry (15 Hours)
Trainee $20
(Module ID 66101-02) 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 60102-02) 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 60103-02) 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.

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 66101-02) Introduces the pipeline industry, processes, petroleum products, pipeline design factors, and basic pipeline operations. Includes basic principles of hydraulic systems, hydraulic properties of petroleum products, pipeline design factors, and basic pipeline equipment.

Abnormal Operating Conditions

Abnormal Operating Conditions Field and Gas

Trainee $20
ISBN 978-0-13-472784-4
(Module ID AOCFG-17) Introduces the abnormal operating conditions that can occur on a pipeline or in a pipeline facility. Explores how to recognize and react to abnormal operating conditions from the control center and the necessary documentation and notifications that must be completed when responding to these conditions.
Pipeline Electrical and Instrumentation

**Curriculum Notes**
- Volume 1: 272.5 Hours
- Volume 2: 240 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 ISBN**
- VOLUME 1
  - Trainee Guide: $100 978-0-13-480564-1
  - Trainee Guide: $100 978-0-13-480565-8

**VOLUME 1**

**Pipeline E&I Safety** (15 Hours)
(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)
(Module ID 64103-02) Presents instrumentation formulas and equations. Explains how to calculate load and ampacity, and perform pipeline-specific E&I calculations. Also provides a description of conductors.

**Electrical Theory** (40 Hours)
(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)
(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)
(Module ID 64204-02) Explains process characteristics and control systems. Describes 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)
(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)
(Module ID 64302-02) Explains power factor and medium versus low-voltage cable and MCCs. Describes types of switchgear and cables, feeders, bussing, and bracing. Includes testing and maintenance on switchgear and MCCs and associated components.

**Pipeline E&I Drawings** (30 Hours)
(Module ID 64107-02) Identifies drawing classifications and written specifications. Describes the uses of electrical drawings and piping and instrumentation drawings. Also covers special drawings and documentation as well as pipeline maps and alignment sheets.

**Understanding the National Electrical Code®** (7.5 Hours)
(Module ID 64108-02) Provides a map for using the NEC®. Introduces the layout and the types of information found within the code book. Presents an easy-to-follow procedure for finding information in the NEC®.

**Fasteners and Anchors** (7.5 Hours)
(Module ID 64109-02) Introduces hardware and systems used to mount and support boxes, receptacles, and other electrical components. Covers types of anchors and supports, their applications, and their safe installation.

**Electrical Installations in Classified Areas** (40 Hours)
(Module ID 64201-02) Explains Class I, II, III, and IV pipeline areas. Describes intrinsically safe devices and systems and their ratings. Also covers allowable conduits and fittings, and explosion-proof enclosures. Explains safe work practices in classified areas, including barriers, PPE, monitoring requirements, and gas detectors.

**Low-Voltage and Standby Power** (25 Hours)
(Module ID 64303-02) Explains pipeline power system standby generators, batteries, chargers, inverters, converters, and rotary and static UPSs. Also addresses the maintenance and testing of each.

**Prime Movers** (32.5 Hours)
(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.

**Field Equipment** (25 Hours)
(Module ID 64305-02) Describes various electric motors and drives and their components. Discusses their maintenance and testing. Explains engine types, cooling and lubrication systems, turbine operation, fuel sources, and controls.

**Facility Auxiliary Systems** (22.5 Hours)
(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)
(Module ID 64307-02) Explains pipeline operations systems, including control, communications, SCADA, and PLCs. Explains redundant systems and control system troubleshooting.

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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 on print on demand
- To purchase individual covered task modules, please visit www.nccer.org/bookstore.

**Trainee Guide:** $100

VOLUME 1
- 122.5 Hours
- Revised: 2017, Third Edition
- Available as print on demand
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

**ISBN:** 978-0-13-471650-3

- **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: $100 978-0-13-480568-9

**VOLUME 2**
- Trainee Guide: $100 978-0-13-480569-6

**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

**Abnormal Operating Conditions - Field and Gas** (5 Hours)
- Module ID AOCFG-17
- Trainee $20

**Pipeline Mechanic Hand and Power Tools** (10 Hours)
- Module ID 63106-02
- Trainee $20

**Piping and Mechanical Blueprint Reading** (15 Hours)
- Module ID 63105-02
- Trainee $20

**Verify or Set Protection Parameters for Programmable Controllers and/or Other Instrumentation Control Loops** (15 Hours)
- Module ID CT26_0-17
- Trainee $20

**Inspect, Test and Calibrate Overfill Protective Devices** (5 Hours)
- Module ID CT30_0-17
- Trainee $20

**Inspect and Calibrate Overfill Protective Devices** (7.5 Hours)
- Module ID CT31_0-17
- Trainee $20

**Inspect, Test and Maintain Temperature Transmitters for Hazardous Liquid Leak Detection** (7.5 Hours)
- Module ID CT44_3-17
- Trainee $20

**Maintain Flow Meters for Hazardous Liquid Leak Detection** (7.5 Hours)
- Module ID CT44_5-17
- Trainee $20

**Prove Flow Meters for Hazardous Liquid Leak Detection** (7.5 Hours)
- Module ID CT44_6-17
- Trainee $20

**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 $20

**Prove Flow Meters for Hazardous Liquid Leak Detection** (7.5 Hours)
- Module ID CT44_7-17
- Trainee $20

**Inspect, Test and Maintain Gravitometers/Densitometers for Hazardous Liquid Leak Detection** (7.5 Hours)
- Module ID CT44_8-17
- Trainee $20

**Maintain Fixed Gas Detection Equipment** (25 Hours)
- Module ID CT55_0-17
- Trainee $20

**Trainee Guide:** $100

VOLUME 2
- 205 Hours
- Revised: 2017, Third Edition
- 140 Hours
- Volume 2: 205 Hours
- Available as print on demand
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

**ISBN:** 978-0-13-470643-6

- **Pipeline Mechanic Hand and Power Tools**
  - **LEVEL 1**

**Piping and Mechanical Blueprint Reading** (15 Hours)
- Module ID 63105-02
- Trainee $20

**Pipeline Mechanic Hand and Power Tools** (10 Hours)
- Module ID 63106-02
- Trainee $20

**Piping and Mechanical Blueprint Reading** (15 Hours)
- Module ID 63104-02
- Trainee $20
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 includes 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 Proviers (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
ISBN 978-0-13-038353-0
(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 pod, 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 Proviers (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

PAPERBACK

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 AOCCE1-17)

Abnormal Operating Conditions - Field and Gas (5 Hours)
Trainee $20
ISBN 978-0-13-472784-4
(Module ID AOCFG-17)

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)
Pipeline Maintenance Level 2 (continued)

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_1-17)
Trainee $20

Backfilling a Trench Following Maintenance (5 Hours)
(Module ID CT39_0-17)
Trainee $20

Conduct Vegetation Survey (5 Hours)
(Module ID CT52_1-17)
Trainee $20

Conduct a Leak Survey with a CGD (5 Hours)
(Module ID CT52_2-17)
Trainee $20

Conduct a Leak Survey with a Flame Ionization Unit (5 Hours)
(Module ID CT52_3-17)
Trainee $20

Vaul t 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

L3 PIPELINE MAINTENANCE

M O D U L E S

Abnormal Operating Conditions - Field and Gas (5 Hours)
(Module ID AOCFG-17)
Trainee $20

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
ISBN 978-0-13-471002-0

Install a Tap Larger Than 2 Inches on a Pipeline (15 Hours)
(Module ID CT40_8-17)
Trainee $20

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_1-17)
Trainee $20

L2 PIPELINE MECHANICAL

Curriculum Notes

• 67.5 Hours
• Revised: 2017, Third Edition
• Available as print on demand
• To purchase individual covered task modules, please visit www.nccer.org/pipeline-program

PAPERBACK
Trainee Guide: $100

MOD U L E S

Abnormal Operating Conditions - Control Center (5 Hours)
(Module ID AOCCC-17)
Trainee $20
ISBN 978-0-13-472782-0

Abnormal Operating Conditions - Field and Gas (5 Hours)
(Module ID AOCFG-17)
Trainee $20
ISBN 978-0-13-472784-4
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.


L2 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


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)

Inspect Main-Line Valves (7.5 Hours)
(Module ID CT20_0-17)

Repair Valve Actuator/Operator, Pneumatic (7.5 Hours)
(Module ID CT21_1-17)

Disassemble and Reassemble Valves (7.5 Hours)
(Module ID CT21_2-17)

Field Quality Control (15 Hours)
(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.

L3 PIPELINE MECHANICAL

Curriculum Notes

LEVEL 3

Internal Inspection of Valves and Their Components (7.5 Hours)
(Module ID CT21_3-17)

Repair Valve Actuator/Operator, Hydraulic (7.5 Hours)
(Module ID CT21_4-17)

Repair Valve Actuator/Operator, Electric (7.5 Hours)
(Module ID CT21_5-17)

Inspect Tank Pressure/Vacuum Breakers (5 Hours)
(Module ID CT22_1-17)

Inspect, Test, and Calibrate HVL Tank Pressure Relief Valves (5 Hours)
(Module ID CT22_2-17)

Maintain and Repair Relief Valves (5 Hours)
(Module ID CT23_1-17)

Inspect, Test, and Calibrate Relief Valves (5 Hours)
(Module ID CT23_2-17)

Maintain and Repair Pressure Limiting Devices (5 Hours)
(Module ID CT24_1-17)

Inspect, Test and Calibrate Pressure Limiting Devices (5 Hours)
(Module ID CT24_2-17)
Pipeline Operations (Control Center/Gas/Liquid) Level 1 (continued)

Liquid Pipeline Measurement and Quality Control (20 Hours)
(Module ID 65107-02) Explains how to activate 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.

Pipeline Corrosion Control

• To purchase individual covered task Modules, please visit www.nccer.org/pipeline-program

PAPERBACK ISBN
Trainee Guide: $100 978-0-13-472539-0

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)

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)
(Module ID CT63_1-17)
Trainee $20 ISBN 978-0-13-472800-1

ShUTDOWN OF A LIQUID PIPELINE (5 Hours)
(Module ID CT64_1-17)

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)

Purge Air from a Gas Pipeline (5 Hours)
(Module ID CT65_0-17)

Test Remotely Controlled Shutdown Devices (5 Hours)
(Module ID CT65_1-17)

Purge Gas from a Pipeline (5 Hours)
(Module ID CT65_2-17)

Operate Odorant Equipment (5 Hours)
(Module ID CT65_3-17)

Monitor Odorant Level (5 Hours)
(Module ID CT65_4-17)

Locally Operate Valves on a Liquid Pipeline System (5 Hours)
(Module ID CT66_4-17)

Remotely 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)

End of Abnormal Operating Conditions - Field and Gas (5 Hours)
(Module ID AOCFG-17)

Pipeline Corrosion Control

• To purchase individual covered task Modules, please visit www.nccer.org/pipeline-program

PAPERBACK ISBN
Trainee Guide: $100 978-0-13-470520-0

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)

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)
(Module ID CT63_1-17)
Trainee $20 ISBN 978-0-13-472800-1

ShUTDOWN OF A LIQUID PIPELINE (5 Hours)
(Module ID CT64_1-17)

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)

Purge Air from a Gas Pipeline (5 Hours)
(Module ID CT65_0-17)

Test Remotely Controlled Shutdown Devices (5 Hours)
(Module ID CT65_1-17)

Purge Gas from a Pipeline (5 Hours)
(Module ID CT65_2-17)

Operate Odorant Equipment (5 Hours)
(Module ID CT65_3-17)

Monitor Odorant Level (5 Hours)
(Module ID CT65_4-17)

Locally Operate Valves on a Liquid Pipeline System (5 Hours)
(Module ID CT66_4-17)

Remotely 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)

End of Abnormal Operating Conditions - Field and Gas (5 Hours)
(Module ID AOCFG-17)
Pipeline Corrosion Control Level 1 (continued)

Install Test Leads by Exothermic Welding Methods (5 Hours)
(Module ID CT2_4-17)

Obtain a Voltage and Current Output Reading from a Rectifier to Verify Proper Performance (5 Hours)
(Module ID CT3_0-17)

Troubleshoot Rectifier (5 Hours)
(Module ID CT4_1-17)

Repair or Replace Defective Rectifier Components (5 Hours)
(Module ID CT4_2-17)

Adjustment of Rectifier (5 Hours)
(Module ID CT4_3-17)

Examine for Mechanical Damage on Buried or Submerged Pipe (5 Hours)
(Module ID CT5_1-17)

Examine for External Corrosion on Buried or Submerged Pipe (5 Hours)
(Module ID CT5_2-17)

Inspect the Condition of External Coating on Buried or Submerged Pipe (5 Hours)
(Module ID CT5_3-17)

Visual Inspection of Atmospheric Coatings (5 Hours)
(Module ID CT7_1-17)

Prepare Surface for Atmospheric Coating Using Hand and Power Tools (5 Hours)
(Module ID CT7_2-17)

Prepare Surface for Coating by Abrasive Water Blasting (5 Hours)
(Module ID CT7_3-17)

Prepare Surface for Coating by Abrasive Blasting Media Other Than Water (5 Hours)
(Module ID CT7_4-17)

Apply Coating Using Hand Application Methods (5 Hours)
(Module ID CT7_5-17)

Apply Coating Using Spray Application (5 Hours)
(Module ID CT7_6-17)

Perform Coating Inspection (5 Hours)
(Module ID CT7_7-17)

Visually Inspect Internal Pipe Surface (5 Hours)
(Module ID CT7_8-17)

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

PAPERBACK ISBN 978-0-13-471651-0
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)

Measure Structure-to-Soil Potentials (5 Hours)
(Module ID CT1_1-17)

Conduct Close Interval Survey (5 Hours)
(Module ID CT1_2-17)

Test and Detect Interference (5 Hours)
(Module ID CT1_3-17)

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)

Measure Pit Depth with Pit Gauge (5 Hours)
(Module ID CT8_1-17)

Measure Wall Thickness with Ultrasonic Meter (5 Hours)
(Module ID CT8_2-17)

Measure Corroded Area (5 Hours)
(Module ID CT8_3-17)

Install Bonds (5 Hours)
(Module ID CT9_1-17)

Install Galvanic Anodes (5 Hours)
(Module ID CT9_2-17)

Install Rectifiers (5 Hours)
(Module ID CT9_3-17)

Install Impressed Current Groundbeds (5 Hours)
(Module ID CT9_4-17)

Repair Shorted Casings (5 Hours)
(Module ID CT9_5-17)
Trainee $20 ISBN 978-0-13-472117-0

Install Electrical Insulating Device (5 Hours)
(Module ID CT9_6-17)

Insert and Remove Coupons (5 Hours)
(Module ID CT10_1-17)

Monitor Probes (Online) (5 Hours)
(Module ID CT10_2-17)

Monitoring and Controlling the Injection Rate of the Corrosion Inhibitor (5 Hours)
(Module ID CT11_0-17)
Introduction to the Power Industry

12.5 Hours
Published: 2010
Module ID 49101-10

PAPERBACK ISBN
Trainee Guide: $22 978-0-13-215413-0

- 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)

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)

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 26501-09; 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

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**POWER GENERATION MAINTENANCE ELECTRICIAN**

**LEVEL 3**

**Curriculum Notes**
- 222.5 Hours
- Published: 2010
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

**PAPERBACK**

**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

**Hand Bending**
(10 Hours)
(Module ID 40206-08; from Industrial Maintenance E&I Technician Level Two)
Trainee $20

**Machine Bending of Conduit**
(15 Hours)
(Module ID 40310-09; 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

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**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**

**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

**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

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Motor Operation and Maintenance  (10 Hours)  
(Module ID 26410-08; from Electrical Level Four, Sixth Edition) 
Trainee $20  

Generator Maintenance  (20 Hours)  
Trainee $20  

Generator Maintenance (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 5040211) 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)  
(Module ID 32401-09; from Industrial Maintenance Mechanic Level Four) 
Trainee $20  

Medium Voltage Terminations/Splices  
(10 Hours)  
(Module ID 26411-08; from Electrical Level Four, Sixth Edition) 
Trainee $20  

Fire Alarm Systems  (15 Hours)  
(Module ID 26405-08; from Electrical Level Four, Sixth Edition) 
Trainee $20  

Heat Tracing and Freeze Protection  (10 Hours)  
(Module ID 26409-08; from Electrical Level Four, Sixth Edition) 
Trainee $20  

Standby and Emergency Systems  (12.5 Hours)  
(Module ID 40401-09; from Industrial Maintenance E&I Technician Level Four) 
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

Lubrication  (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  

Oxyfuel Cutting  (17.5 Hours)  
(Module ID 40104-07; 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  

Gaskets and Packing  (10 Hours)  
(Module ID 40105-07; from Industrial Maintenance E&I Technician Level One) 
Trainee $20  

Welding Level One, Fourth Edition) 
Trainee $20  

SMAW Equipment and Setup  (5 Hours)  
(Module ID 40205-07; from Industrial Maintenance E&I Technician Level Two) 
Trainee $20  

Int. Safety for E&I Techs  (5 Hours)  
(Module ID 40206-07; 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  

Medium Voltage Terminations/Splices  
(10 Hours)  
(Module ID 26411-08; from Electrical Level Four, Sixth Edition) 
Trainee $20  

Power Generation Maintenance Electrician Level 3 (continued)
Power Generation I&C Maintenance Technician Level 2 (continued)

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 I&C MAINTENANCE TECHNICIAN

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
ISBN
Trainee Guide: $97
978-0-13-215434-5

MODULES

Instrumentation Electrical Circuitry (25 Hours)
(Module ID 12305-03; from Instrumentation Level Three, Second Edition)
Trainee $20

Process Mathematics (15 Hours)
(Module ID 40207-08; 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 $20

Instrument Drawings and Documents, Part One (15 Hours)
(Module ID 40211-08; from Industrial Maintenance E&I Technician Level Two)
Trainee $20

Electrical Systems for Instrumentation (22.5 Hours)
(Module ID 40204-01; from Instrumentation Level One, Second Edition)
Trainee $20

Relays and Timers (7.5 Hours)
(Module ID 12208-03; from Instrumentation Level Two, Second Edition)
Trainee $20

Switches and Photoelectric Devices (5 Hours)
(Module ID 12209-03; from Instrumentation Level Two, Second Edition)
Trainee $20

Tubing (15 Hours)
(Module ID 40209-08; from Industrial Maintenance E&I Technician Level Two)
Trainee $20
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 $20

Layout and Installation of Tubing and Piping Systems (22.5 Hours)
(Module ID 40309-09; from Industrial Maintenance E&I Technician Level Three)
Trainee $20

Electronic Components (10 Hours)
(Module ID 40302-09; from Industrial Maintenance E&I Technician Level Three)
Trainee $20

Panel-Mounted Instruments (7.5 Hours)
(Module ID 12212-03; from Instrumentation Level Two, Second Edition)
Trainee $20

Installing Field-Mounted Instruments (25 Hours)
(Module ID 12213-03; from Instrumentation Level Two, Second Edition)
Trainee $20

Grounding and Shielding of Instrumentation Wiring (10 Hours)
(Module ID 12306-03; from Instrumentation Level Three, Second Edition)
Trainee $20

Analyzers (20 Hours)
(Module ID 12408-03; from Instrumentation Level Four, Second Edition)
Trainee $20

L4 POWER GENERATION I&C MAINTENANCE TECHNICIAN

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
ISBN
Trainee Guide: $97
978-0-13-215437-6

MODULES

Standby and Emergency Systems (12.5 Hours)
(Module ID 40401-09; from Industrial Maintenance E&I Technician Level Four)
Trainee $20

Basic Process Control Elements, Transducers and Transmitters (15 Hours)
(Module ID 40402-09; from Industrial Maintenance E&I Technician Level Four)
Trainee $20

Instrument Calibration and Configuration (10 Hours)
(Module ID 40403-09; from Industrial Maintenance E&I Technician Level Four)
Trainee $20

Pneumatic Control Valves, Actuators and Positioners (40 Hours)
(Module ID 40404-09; from Industrial Maintenance E&I Technician Level Four)
Trainee $20

Performing Loop Checks (7.5 Hours)
(Module ID 40405-09; from Industrial Maintenance E&I Technician Level Four)
Trainee $20

Troubleshooting and Commissioning a Loop (10 Hours)
(Module ID 40406-09; from Industrial Maintenance E&I Technician Level Four)
Trainee $20

Process Control Theory (20 Hours)
(Module ID 12204-03; from Instrumentation Level Two, Second Edition)
Trainee $20

Process Control Loops and Tuning (20 Hours)
(Module ID 40407-09; from Industrial Maintenance E&I Technician Level Four)
Trainee $20

Data Networks (15 Hours)
(Module ID 40408-09; from Industrial Maintenance E&I Technician Level Four)
Trainee $20

Digital Logic Circuits (10 Hours)
(Module ID 12401-03; from Instrumentation Level Four, Second Edition)
Trainee $20

To Order Call 1-800-922-0579

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www.nccer.org/instructors 87
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 Technician 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)
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  

Introduction to Ferrous Metal Piping Practices (5 Hours)  
(Module ID 32204-07; from Industrial Maintenance Mechanic Level Two)  
Trainee $20  
ISBN 978-0-13-604624-0

Identify, Install and Maintain Valves (10 Hours)  
(Module ID 32205-07; 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 (12.5 Hours)  
(Module ID 15410-08; from Millwright Level Four)  
Trainee $20  

Motor-Operated Valves (15 Hours)  
(Module ID 40313-09; from Industrial Maintenance Equipment 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.

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  

Power Generation Maintenance Mechanic Level 2 (continued)

LEVEL 3


LEVEL 4


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

To address the need for one standardized and nationally recognized Power Line Worker curriculum, NCCE 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
(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; crimpers; cable cutters; pneumatic tools; and powder-actuated tools.

Aerial Framing and Associated Hardware (80 Hours)
Trainee $20
(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
(Module ID 49109-11) 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
(Module ID 49110-11) Explains how to select and use rigging equipment. Covers common rigging equipment and rigging methods that are likely to be used by power line workers. Also covers hand signals and other methods of communication between the rigger and the crane operator.

Setting and Pulling Poles (20 Hours)
Trainee $20
(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
(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
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.

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 values in series, parallel, and combination DC circuits using 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.

Cable and Conductor Installation and Removal (20 Hours)
Trainee $20
(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
ISBN 978-0-13-274263-4
(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.
Overhead and URD Service Installations (15 Hours)
Trainee $20
(Module ID 80301-12) Covers tools such as hot sticks, shotgun sticks, and wire tongs, along with the PPE and safe work practices that are critical elements of live line and bare hand work. Includes coverage of various live-line tasks such as different methods of moving conductors and replacing insulators, cross-arms, and poles.

Three-Phase URD Systems (25 Hours)
Trainee $20
ISBN 978-0-13-296759-4
(Module ID 80301-12) Covers tools such as hot sticks, shotgun sticks, and wire tongs, along with the PPE and safe work practices that are critical elements of live line and bare hand work. Includes coverage of various live-line tasks such as different methods of moving conductors and replacing insulators, cross-arms, and poles.

System Protection and Monitoring (7.5 Hours)
Trainee $20
(Module ID 80303-12) Presents 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.

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 $43
(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.

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.

Conductor Terminations and Splicing (2.5 Hours)
Trainee $20
(Module ID 26208-11; from Electrical Level Two, Seventh Edition)

Concrete Work (35 Hours)
Trainee $20
(Module ID 22106-12; from Heavy Equipment Operations Level One)

Intermediate Rigging (10 Hours)
Trainee $20
(Module ID 38201-11; from Intermediate Rigger, Second Edition)

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Power Line Worker: Substation Level 3

L3 POWER LINE WORKER: SUBSTATION

Curriculum Notes

• 167.5 Hours
• Published: 2012
• Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK ISBN
Trainee Guide: $97 978-0-13-294866-1

Modules

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

Temporary Grounding (15 Hours)
(Module ID 40308-09; from Industrial Maintenance E&I Level Three)

Advanced Drawing Reading (20 Hours)
(Module ID 82301-12) Covers the drawings typically associated with substations and the skills needed for their interpretation. Provides detailed instruction on elementary, schematic, and general component arrangement drawings. Wiring diagrams and drawing schedules are also covered.

Medium- and High-Voltage Equipment Installation (25 Hours)
(Module ID 82302-12) Presents the typical installation procedures for primary substation components. Identifies the common and unique factors related to the proper installation of transformers, circuit breakers, capacitors, reactors, bus systems, and insulators. A discussion of corona and how proper installation techniques can prevent it is also included.

Control House (20 Hours)
(Module ID 82303-12) Provides an overview of the substation control house and its function in the substation. The components and protective systems generally contained within a control house are examined, including the essential DC power systems and emergency power supplies. Coverage of racking systems and their layout is also included.

Connectors, Conductor Terminations, and Splicing (25 Hours)
(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 clamps are introduced, along with hi-pot testing procedures for terminations and splices.

Equipment Testing and Maintenance (30 Hours)
(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.

System Protection and Control (12.5 Hours)
(Module ID 82306-12) Describes the protective functions required in the substation environment to defend against 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 substation is included.

Fundamentals of Crew Leadership (20 Hours)
(Module ID 46101-11, 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.

Transmission Equipment Installation (50 Hours)
(Module ID 81203-11) Focuses on the safe installation of insulators and conductors. Coverage includes stringing and splicing of conductors, conductor terminations, conductor sagging, clamping in, and the installation of accessories such as vibration dampers, spacers, warning lights, and dog markers.

Transmission System Maintenance (40 Hours)
(Module ID 81204-11) Coverage includes safety practices related to working with helicopters, as well as inspection of insulators, towers, and poles. Discusses clearance procedures and environmental concerns such as protection of wetlands, watersways, and wildlife.

L3 POWER LINE WORKER: TRANSMISSION

Curriculum Notes

• 200 Hours
• Published: 2012
• Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK ISBN
Trainee Guide: $97 978-0-13-294867-8

Modules

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

Construction, Maintenance, and Repair – Live-Line Barehand (40 Hours)
(Module ID 81301-12) Describes the methods used to work on live transmission lines by bonding to the line. Covers safety practices and PPE, and includes coverage of bonded buckets, non-conductive suits, insulated ladders, bonding jumpers, and rescue procedures.

Reconductoring Transmission Lines (40 Hours)
(Module ID 81302-12) Describes the replacement of existing transmission conductors as contrasted with installation of new conductors. Coverage includes pulling equipment setup, guard structures, and permit requirements. Includes live-line replacement as well as use of the existing conductors to pull the replacement conductors.

Construction, Maintenance, and Repair – Hot Stick (80 Hours)
(Module ID 81303-12) Covers tools such as hot sticks, shotgun sticks, and wire tongs, along with the PPE and safe work practices that are critical elements of live-line and bare-hand work. Includes coverage of live-line tasks such as replacing insulators, cross-arms, and spacers.

Lift Planning (40 Hours)
(Module ID 38302-11; from Advanced Rigger, First Edition)
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.

Managing Electrical Hazards

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Managing Electrical Hazards (5 hours)

Trainee $20


See p. 24 for more information.

Fall Protection Orientation

PAPERBACK

8 Hours

Module ID 75901


Covers fundamental safety and hazard recognition concepts. Introduces the role of OSHA in regulating elevated work on the jobsite and the causes, costs, and consequences of falls. Presents proper use of fall protection equipment; safe use of stairs, ladders, and scaffolds; and guidelines for use of aerial lifts.

Horizontal Directional Drilling Hazards

2.5 Hours

Module ID 75113-03

PAPERBACK

Trainee Guide: $20


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Introduces the hazards related to performing and working near horizontal directional drilling operations. Covers related on-site safety and emergency-response procedures.

Confined Spaces and Excavations (5 hours)

Trainee $20


(Module ID 75120-13) Covers safety precautions related to working in confined spaces, including the responsibilities and duties of each member of the confined-space entry team. It also covers the safety hazards and safeguards required when working in an excavation, including an explanation of various trenching supports and soil types.

Work-Zone Safety (5 hours)

Trainee $20


(Module ID 75104-13) Introduces the signs, signals, and barricades found on various job sites, and covers highway work-zone safety requirements.

Electrical Safety (5 hours)

Trainee $20


(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.

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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, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK ISBN
Participant Guide: $85 978-0-13-106258-0

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)
(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)
(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)
(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)
(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)
(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)
(Module ID 75222) Discusses 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)
(Module ID 75223) Describes how to prepare and deliver effective training using both formal safety meetings and tailgate talks.

Permits and Policies (5 hours)
(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)
(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)
(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.
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