2018 NCCER CURRICULUM CATALOG

BUILT FOR INDUSTRY, BY INDUSTRY.
Standardized, competency-based curricula for construction professionals.
Exciting Product Changes Coming in 2018!
NCCER is excited to announce improvements to our product development process are being implemented in 2018! Stay up-to-date with these and all other NCCER updates 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.
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## Order Books

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## NCCERconnect Access

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## Custom Books

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<td>No, I’m a new customer.</td>
<td>Contact your Pearson/NCCER executive director.</td>
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## Desk copy or general questions about product

Contact your Pearson/NCCER executive director.

## Instructor Resources

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<th>Visit nccerirc.com. (Access code is required.)</th>
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<td>Code is provided in the printed Instructor Guide, which may be purchased through Pearson Ordering Department.</td>
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## Additional FAQs:

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<th>Pipeline ordering information:</th>
<th>Visit nccer.org/pipeline-program.</th>
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Call 800.848.9500, visit oasis.pearson.com or email K12CustomerService@pearson.com. Fax your order toll-free to: 877-260-2530. Mail your purchase order to: Pearson, PO Box 6820, Chandler, AZ 85246

Note: Remember to clearly mark “CONFIRMATION” on any paper copy of a phone or faxed-in order.

Call 800.848.9500 to place your first order and set up your account.

Call 800.922.0579, visit oasis.pearson.com or email pearson-ot.orderdept@pearson.com Fax your order toll-free to: 800.445.6991. Mail your purchase order to: Pearson Higher Education Order Department, PO Box 3039, Lebanon, IN 46052

Call 800.922.0579 to place your first order and set up your account.

Note: First time business customers need to provide information to verify the business they work for and fill out a credit application. You will receive your 11-digit Pearson account number and order confirmation via email within 48-72 hours of the call. An account can only be opened when placing an order.

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

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

Visit nccerconnect.com and click register.

Contact your Pearson/NCCER executive director.

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

Visit pearsonhighered.com/collections to create a custom book. A custom book ISBN will be created and sent to you via email within 48-72 hours of creating your book.

Ordering and Customer Service

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

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

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

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

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

Payment Terms
Net 30 days.

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

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

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

Pearson Tech Support
800-677-6337

International Orders
Phone: 800-635-3889
Email: intlcs@pearsoned.com
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Region 1 | Brian Mann
Ballston Spa, NY
Tel: 1-800-720-3870 ext. 5
brian.mann@pearson.com
IL, MI, NM, NY, OK, TX, WI

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william.underwood@pearson.com
AL, AR, IA, KS, LA, MN, MO, MS, ND, NE, SD, TN

International Orders
Phone: 1-800-635-3889
Email: intlcs@pearsoned.com

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susan.muggeo@pearson.com
CT, DE, IN, KY, MA, ME, NH, NJ, OH, PA, RI, VT, WV

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stephen.healy@pearson.com
DC, FL, GA, MD, NC, SC, VA

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karen.keith@pearson.com
AK, AZ, CA, CO, HI, ID, MT, NV, OR, UT, WA, WY
Letter from the Chairman of the Board

After nearly 40 years in the industry, I know high performing contractors and successful projects share one important ingredient, a commitment to workforce development which fosters employee retention. NCCER’s workforce development resources are used by successful contractors who recognize that their employees receive the highest standard of quality training, best of class curricula and comprehensive assessments that all lead to industry-recognized credentials and rewarding careers.

Based on the national discussion around rebuilding our infrastructure, NCCER has released an updated Heavy Highway program this year that offers a new helper credential and introduces trainees to the various crafts utilized in the heavy highway industry. More details can be found on pages 29—30 and at nccer.org/heavy-highway.

To continue with the momentum, the popular Rigger, Signal Person and Mobile Crane curricula will be released this spring with the much anticipated revision of all four levels of the HVAC curriculum following this summer. Managing Electrical Hazards, Mechanical Insulating Levels 1-3 and Safety Technology have also been revised and will be released this year.

Building on the quickly emerging role technology plays in industry and education, NCCER’s advancements in 2017 included a new online testing system and enhanced registry system. The testing system has simplified creating, scoring and submitting tests while the updated registry features new easier to use options. As NCCER continues to streamline its online experience, a new Instructor Resource Center will be released during the first quarter that will provide easy access to multiple NCCER resources.

NCCER remains a vital part of our industry as the established benchmark for quality workforce development. I look forward to serving as NCCER chairman this year and to continuing to work towards creating a safe, productive and sustainable workforce.

C. Rockwell Turner
President of LPR Construction
2018 Chairman of the NCCER Board of Trustees
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 Northern California Chapter
ABC of Iowa
ABC Pelican Chapter
ABC Southern California Chapter
Aegion Corporation
Alaska Operating Engineers/Employers
Balfour Beatty Infrastructure, Inc.
Bay, Ltd.
Beacon Electrical Contractors
Bechtel
Blythe Development Co
Bo-Mac Contractors, Ltd.
Bridgerland Applied Technology College
Builders Association of North Central Florida
Career Safety Center
Carolina Bridge Company, Inc.
Center for Employment Training
Charah
Cianbro Corporation
Corpro Companies, Inc.
CowboysCranes.com
Crowder Construction Company
Duke Energy
Exelon Generation
Faith Technologies, Inc.
Fluor
Gaylord Electric, Inc.
Harbor Energy Solutions
Hubbard Construction Company
Industrial Management and Training Institute, Inc.
ISC Constructors, LLC
Jacobs Field Services
John Deere
Kelley Construction
Kinder Morgan Inc.
Lamphear Electric
Lee College
Lee Company
Madison Comprehensive High School
Mammoet
Michels Corporation
National Field Services, Inc.
North American Crane Bureau
Orion Marine Group
Pipeline Performance Group, LLC
Pro Circuit, Inc.
Putnam Career and Technical Center
R.E. Burns & Sons Co., Inc.
Santa Fe College
Southland Safety
Specialized Services
Sundt Construction
Tri-City Electrical Contractors
Windham School District
Zenith Education Group
Workforce Development Leaders Wanted

The need for workforce development professionals and mentors is at an all-time high. In response, NCCER released two new training programs: Construction Workforce Development Professional and Mentoring for Craft Professionals. Both titles were developed by teams of subject matter experts and can be ordered directly from shop.ncer.org.

New in 2018

Heavy Highway Construction

- Redesigned Level 1 covers fundamental skills and knowledge for the industry
- Newly added Level 2 covers more advanced areas of heavy highway construction
- Instructor package includes lesson plans and dynamic PowerPoints®
- Series includes:
  - Six new and two revised Heavy Highway Construction specific modules
  - Four newly revised or created modules from Rigger, Mobile Crane Operations and Signal Person

Revised Crane Series:

- Basic, Intermediate and Advanced Rigger, 3rd Ed.
- Mobile Crane Operator Levels 1-3, 3rd Ed.
- Signal Person, 2nd Ed.

Visit the Book Status Updates page on the Online Bookstore to check for new releases throughout the year: www.ncer.org/book-updates
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 6,600 Master Trainers and over 67,000 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 curriculum meet or exceed industry standards. NCCER’s curriculum 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 14 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 through its three primary goals:

1. Make career and technical education a priority in secondary schools.
2. Shift negative public perception about careers in the construction industry.
3. Provide a path from ambition, to training, to job placement as a craft professional.

BYF provides a number of resources to assist industry, education and military organizations in achieving these goals. Check out BYF’s new website at byf.org for free interactive and downloadable resources.

In addition, a full array of resources for classrooms and career days is available on BYF’s online store at byfstore.nccer.org.
Assessments
NCCER offers a complete series of journey-level assessments. These assessments evaluate the knowledge and skill level of an individual in a specific craft area. All assessments are based on NCCER curricula and have been developed in conjunction with Prov™, NCCER’s test development partner. An individual’s certification is documented through the NCCER Registry System. For additional assessment information, visit www.nccer.org.

**Journey Level**
- Boilermaker:
  - Pressure Vessel
- Commercial Carpenter
- Commercial Electrician
- Concrete Finisher*
- Drywall Mechanic*
- Heavy Equipment Operator:
  - Backhoe
  - Dozer
  - Dump Truck
  - Excavator
  - Forklift
  - Loader
  - Motor Grader
  - Roller
  - Scraper
  - Skid Steer
- HVAC Technician
- Industrial Boilermaker:
  - Maintenance
  - Exchanger
- Industrial Carpenter*
- Industrial Coating and Lining Application Specialist:
  - Level 1
  - Level 2
- Industrial Electrician*
- Industrial Insulator*
- Industrial Ironworker*
- Industrial Maintenance Electrical and Instrumentation Technician
- Industrial Maintenance Mechanic
- Industrial Maintenance Support Mechanic
- Industrial Millwright
- Industrial Painter*
- Industrial Pipefitter*
- Instrumentation Fitter
- Instrument Technicians*
- Manufactured Construction Technology:
  - Level 1
  - Level 2
- 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
Welcome to our new and improved Instructor Resource Center!

This new Instructor Resource Center offers easy access to all of our resources including:

- Lesson Plans
- Performance Profile Sheets
- PowerPoints
- Test Questions
- And more!

What’s new?

- Register one time to set up single sign on for Instructor Resource Center, NCCERconnect and Pearson Collections
- Once registered, access is for all NCCER crafts
- Current NCCERconnect and Pearson Collections users can use their logins for the new Instructor Resource Center
- Test banks are provided in an easy to download PDF

Visit our Instructor Resource Center at www.nccer.org/irc
NCCERconnect fosters learning within and beyond the classroom through a media rich eText and a course management system.

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

**Highlights of this fully integrated learning program:**

- **Gradebook**: A robust gradebook allows you to see multiple views of your classes’ progress. Completely customizable and exportable, the gradebook can be adapted to meet your specific needs.

- **Multimedia Library**: Students and instructors can quickly search through resources and find supporting media.

- **Pearson eText**: Rich media options let students watch example videos as they read or do homework.

- **Course Management**: A full suite of course management features including email, document uploading, announcements, gradebook and instructor tools.

NCCERconnect is currently available with eText for the following crafts:

- Carpentry
- Construction Technology
- Core Curriculum
- Electrical
- Electronic Systems Technician
- Fundamentals of Crew Leadership
- Heavy Equipment Operator
- HVAC
- Plumbing
- Welding

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

**Pearson Collections**

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

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

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

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

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

System includes:
- Platform managed in-house by NCCER
- Single Sign-On with registry system (only one login/password for both)
- Proctor Station for ease in test administration
- Automatic submission to NCCER’s Registry System
- Web-based platform does not require any special software or hardware
- Operates on all major browsers
- Automatically conforms to multiple devices – (i.e. laptops, tablets, Google Chromebooks, Macbooks)

New Testing System
Want to save countless hours administering, scoring and submitting module completions?

NCCER’s new testing system electronically creates, launches, scores, stores and submits module tests. Say goodbye to all those Form 200s!

Previous processes required craft instructors to generate, administer and score NCCER module tests and then submit for credentials. The new system allows for all of this to be done electronically while also eliminating the need for paper-based tests and record storage. Completed Performance Profiles can be entered directly into the system.

Visit ncce.org/testing for information about online training resources!

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

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

#### Product Design and Supplements

Each craft area comprises successive levels, and each level comprises individual units of study called modules. Modules can be treated as separate task-training units because each one contains objectives as well as knowledge and performance tests. Instructors may teach a single module or the entire craft level and 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/Objectives Lists** — Includes all competencies and comprehensive learning objectives for each craft.
- **Performance Profiles** — Correlates to the performance tasks of NCCER curricula and can be used to provide record keeping where documentation of training is required.
- **Equipment and Material Lists** — Includes all of the equipment and materials required to teach each module.
- **Course Maps** — Tracks revised modules, records new module numbers and shows how modules may have been incorporated into revisions or indicates if they have been deleted.

#### Module ID Numbers

Here’s an easy way to read NCCER’s Module ID numbers:

```
29102-17
```

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

The three digits before the hyphen are unique module identifiers.

The two-digit suffix (17) indicates the year of publication.

#### 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.

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<td>Boilermaking</td>
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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
Published: 2006

**Basic Safety**
(Construction Site Safety Orientation)
12.5 Hours
Revised: 2015
Module ID 00010-15
Instructor's Edition: 978-0-13-412993-9

- Division
- Decimals/Percentages
- Reading
- Measurements
- Calculating Area
- Powers of Ten
- Linear Measure, Angles, Volumes, Pressure, and Slopes
- Solving for Unknowns
- Square Inches, Feet, and Yards
- Volume

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

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**Core Curriculum: Introductory Craft Skills**

**INTRODUCTORY CRAFT SKILLS**

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

### MODULES

**Core Curriculum: Introductory Craft Skills**

- **Downloadable instructor resources that include module tests, PowerPoints®, 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.

#### HARDCOVER ISBN
- Trainee Guide: $57 978-0-13-431343-6
- PAPERBACK ISBN
  - Trainee Guide: $54 978-0-13-431098-9
- SPANISH ISBN
- NCCERConnect Access Card: $54 978-0-13-423592-9

### Modules

#### Basic Safety (Construction Site Safety Orientation) (12.5 Hours)

- **Trainee $20**
- **Instructor $20**

  (Module ID 00010-15) Identifies the hazards associated with particular tools and materials commonly used in the construction trades. Discusses 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.

#### Introduction to Basic Rigging (7.5 Elective Hours)

- **Trainee $20**
- **Instructor $20**

  (Module ID 00016-15) 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 Employability Skills (7.5 Hours)

- **Trainee $20**
- **Instructor $20**

  (Module ID 00017-15) 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.

#### Introduction to Construction Drawings (10 Hours)

- **Trainee $20**
- **Instructor $20**

  (Module ID 00015-15) 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.

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

### Powers of Ten

- **Volume**
- **Linear Measure, Angles, Volumes, Pressure, and Slopes**
- **Solving for Unknowns**
- **Square Inches, Feet, and Yards**
- **Volume**

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**Applied Construction Math**
A Novel Approach
Published: 2006

- Division
- Decimals/Percentages
- Reading
- Measurements
- Calculating Area
- Powers of Ten
- Linear Measure, Angles, Volumes, Pressure, and Slopes
- Solving for Unknowns
- Square Inches, Feet, and Yards
- Volume

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

Core Curriculum

Boilermaking Tools (15 Hours)
Trainee $20
Instructor $20
(Module ID 34103-10) Introduces the hand and power tools used by boilermakers, and the associated safety concerns.

Basic Materials (10 Hours)
Trainee $20
Instructor $20
(Module ID 34104-10) Identifies materials used in the construction of boilers, including material properties, standards and codes, and material markings.

Oxyfuel Cutting (12.5 Hours)
Trainee $20
Instructor $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
Instructor $20
ISBN 978-0-13-213699-0
ISBN 978-0-13-213743-0
(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
Instructor $20
(Module ID 34107-10) Describes how to clean and prepare base metals for cutting and welding.

Welding Basics (22.5 Hours)
Trainee $20
Instructor $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.

Boiler Systems and Components (22.5 Hours)
Trainee $20
Instructor $20
(Module ID 34201-11) Introduces boiler configurations and applications. Identifies boiler components and explains their functions.

Identifying and Installing Valves (20 Hours)
Trainee $20
Instructor $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.

Your Role in the Green Environment

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

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

Pipe Hangers and Supports (25 Hours)
Trainee $20
Instructor $20
(Module ID 34203-11) Identifies pipe hangers and supports and explains how to interpret pipe support drawings and symbols. Explains how to select, store, handle, install, and maintain spring hanger supports.

Drawings and Detail Sheets (15 Hours)
Trainee $20
Instructor $20
ISBN 978-0-13-257800-4
(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
Instructor $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.

Welding Symbols (5 Hours)
Trainee $20
Instructor $20
(Module ID 34206-11) Explains how to read symbols on welding drawings, specifications, and welding procedure specifications. Describes the symbols for weld symbols, groove welds, miscellaneous other welds, and non-destructive tests.

Socket Weld Pipe Fabrication (25 Hours)
Trainee $20
Instructor $20
(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)
Trainee $20
Instructor $20
(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)
Trainee $20
Instructor $20
(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 fabricate 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 $20
Instructor $20
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 gouging and washing activities.

Boiler Hangers and Supports (25 Hours)
Trainee $20
Instructor $20
ISBN 978-0-13-257807-4
(Module ID 34211-11) Describes equipment for washing and gouging activities. Provides instructions for using CAC-A electrodes, and how to prepare the work area and CAC-A equipment for safe operation. 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 gouging and washing activities.

Testing Piping Systems and Equipment (20 Hours)
Trainee $20
Instructor $20
(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.

Advanced Structural Welding (15 Hours)
Trainee $20
Instructor $20
(Module ID 34309-11) Explains the functions of towers and exchangers and the basic distillation process. Describes various types of towers and exchangers and their components.
Boilermaking Level 4 (continued)

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

**Quality Assurance** (10 Hours)
Instructor $20  ISBN 978-0-13-292252-4
(Module ID 34407-12) Covers codes governing welding and boilers. Describes weld imperfections and their causes. Identiﬁes and explains different nondestructive and destructive testing methods. Explains how to make visual inspections of ﬁllet welds. Describes welder qualiﬁcation testing, and stresses the importance of quality workmanship.

**Advanced Exchangers** (25 Hours)
Instructor $20  ISBN 978-0-13-292253-1
(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)
Instructor $20  ISBN 978-0-13-292254-8
(Module ID 34412-12) Identiﬁes different types of towers and their components. Explains how to remove and replace different types of packing used in towers. Describes methods used to make ﬁeld repairs to tower trays. Explains how to remove a tower distributor for maintenance.

**Fundamentals of Crew Leadership** (20 Hours)
(Module ID 46101-11, Second Edition) Covers basic leadership skills and explains different leadership styles, communication, delegating, and problem solving. 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.

---

**Carpentry**

**L1 CARPENTRY**

**LEVEL 1**

**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, PowerPoint®, and performance proﬁle sheets are available at www.nccer.org/irc.
- A Spanish translation of the fourth edition is available. Please see NCCER’s online catalog for more information.

**HARDCOVER**


**PAPERBACK**


**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)
(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)
(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)
Instructor $20  ISBN 978-0-13-340311-4
(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)
Instructor $20  ISBN 978-0-13-340312-1
(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.

**Floor Systems** (25 Hours)
(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)
(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)
(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)
(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  ISBN 978-0-13-340306-0
(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.
Carpentry Level 2

L2 CARPENTRY FRAMING & FINISHING

Curriculum Notes
- 210 Hours
- Optional Residential Path: 170 Hours
- Optional Commercial Path: 150 Hours
- Revised: 2013, Fifth Edition
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

HARDCOVER ISBN
Trainee Guide: $99 978-0-13-340465-4
NCCERconnect Access Card: $97 978-0-13-442808-6
NCCERconnect + Paperback Trainee Guide: $122 978-0-13-453972-0

PAPERBACK ISBN
NCCERconnect Access Card: $97 978-0-13-442808-6
NCCERconnect + Paperback Trainee Guide: $122 978-0-13-453972-0

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.

Commercial Drawings Elective for Residential Path (25 Hours)
Trainee S20 978-0-13-377929-5
Instructor S20 978-0-13-377918-9
(Module ID 27201-13) Describes how to read and interpret a set of commercial drawings and specifications.

Cold-Formed Steel Framing (15 Hours)
Trainee S20 978-0-13-377910-3
Instructor S20 978-0-13-377923-3
(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 non-bearing walls, partitions, and other applications.

Exterior Finishing Elective for Commercial Path (35 Hours)
Trainee S20 978-0-13-377909-7
Instructor S20 978-0-13-377922-6
(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 (75 Hours)
Trainee S20 978-0-13-377903-5
Instructor S20 978-0-13-377921-9
(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 Elective for Commercial Path (25 Hours)
Trainee S20 978-0-13-377902-8
Instructor S20 978-0-13-377919-6
(Module ID 27202-13) Describes how to properly prepare the roof deck and install roofing for residential and commercial buildings.

L3 CARPENTRY FORMS

Curriculum Notes
- 160 Hours
- Revised: 2014, Fifth Edition
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.
- A Spanish translation of the fourth edition is available. Please see NCCER’s online catalog for more information.

PAPERBACK ISBN
Trainee Guide: $97 978-0-13-382305-9
NCCERconnect Access Card: $97 978-0-13-442809-3
NCCERconnect + Trainee Guide: $122 978-0-13-453970-6

Doors and Door Hardware (20 Hours)
Trainee S20 978-0-13-377914-1
Instructor S20 978-0-13-377925-7
(Module ID 27208-13) Describes the installation of metal doors and related hardware in steel-framed, wood-framed, and masonry walls, along with their related hardware, such as latches and door closers. Also discusses the installation of wood doors, folding doors, and pocket doors.

Drywall Installation (15 Hours)
Trainee S20 978-0-13-377911-0
Instructor S20 978-0-13-377926-4
(Module ID 27206-13) Describes the various types of gypsum drywall, their uses, and the fastening devices and methods used to install them. Contains detailed instructions for installing drywall on walls and ceilings using nails, drywall screws, and adhesives. Also discusses fire- and sound-rated walls.

Drywall Finishing (17.5 Hours)
Trainee S20 978-0-13-377913-4
Instructor S20 978-0-13-377924-0
(Module ID 27207-13) Describes the materials, tools, and methods used to finish and patch gypsum drywall. Also discussed automatic and manual taping and finishing tools.

Suspended Ceilings Elective for Residential Path (15 Hours)
Trainee S20 978-0-13-377915-8
Instructor S20 978-0-13-377927-1
(Module ID 27209-13) Describes the materials, layout, and installation procedures for many types of suspended ceilings used in commercial construction, as well as ceiling tiles, drywall suspension systems, and pan-type ceilings.

Window, Door, Floor, and Ceiling Trim (25 Hours)
Trainee S20 978-0-13-377916-5
Instructor S20 978-0-13-377928-8
(Module ID 27210-13) Describes the different types of trim used in finish work and focuses on the proper methods for selecting, cutting, and fastening trim to achieve a professional finished appearance.

Cabinet Installation (10 Hours)
Trainee S20 978-0-13-377917-2
Instructor S20 978-0-13-377929-5
(Module ID 27211-13) Provides detailed instructions for the selection and installation of base and wall cabinets and countertops.

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.

Properties of Concrete (10 Hours)
Trainee S20 978-0-13-378674-3
Instructor S20 978-0-13-378685-9
(Module ID 27303-14) Describes the properties, characteristics, and uses of cement, aggregates, and other materials used in different types of concrete. Covers procedures for estimating concrete volume and testing freshly mixed concrete, as well as methods and materials for coining concrete.

Rigging Equipment (10 Hours)
Trainee S20 978-0-13-378675-0
Instructor S20 978-0-13-378686-6
(Module ID 38101-11; from Basic Rigger, Second Edition)

Rigging Practices (15 Hours)
Trainee S20 978-0-13-378676-7
Instructor S20 978-0-13-378688-0
(Module ID 38102-11; from Basic Rigger, Second Edition)

Trenching and Excavating (15 Hours)
Trainee S20 978-0-13-378678-1
Instructor S20 978-0-13-378689-7
(Module ID 27306-14) Provides an introduction to working in and around excavations, particularly in preparing building foundations. Describes types and bearing capacities of soils; procedures used in shoring, shielding, and sloping trenches and excavations; trenching safety requirements, including recognition of unsafe conditions; and mitigation of groundwater and rock when excavating foundations.

Foundations and Slabs-On-Grade (20 Hours)
Trainee S20 978-0-13-378680-4
Instructor S20 978-0-13-378691-0
(Module ID 27307-14) Covers basic site layout safety, tools, and methods; layout and construction of deep and shallow foundations; types of foundation forms; layout and formation of slabs-on-grade; and forms used for curbing and paving.

Vertical Formwork (22.5 Hours)
Trainee S20 978-0-13-378681-1
Instructor S20 978-0-13-378692-7
(Module ID 27308-14) Covers the applications and construction methods for types of forming and form hardware systems for walls, columns, and stairs, as well as slip and climbing forms. Provides an overview of the assembly, erection, and stripping of gang forms.

Horizontal Formwork (15 Hours)
Trainee S20 978-0-13-378682-8
Instructor S20 978-0-13-378693-4
(Module ID 27309-14) Describes elevated decks and formwork systems and methods used in their construction. Covers joists, pans, and related hardware in steel-framed, wood-framed, and rock when excavating foundations.

Foundations and Slabs-On-Grade (20 Hours)
Trainee S20 978-0-13-378680-4
Instructor S20 978-0-13-378691-0
(Module ID 27307-14) Covers basic site layout safety, tools, and methods; layout and construction of deep and shallow foundations; types of foundation forms; layout and formation of slabs-on-grade; and forms used for curbing and paving.

Vertical Formwork (22.5 Hours)
Trainee S20 978-0-13-378681-1
Instructor S20 978-0-13-378692-7
(Module ID 27308-14) Covers the applications and construction methods for types of forming and form hardware systems for walls, columns, and stairs, as well as slip and climbing forms. Provides an overview of the assembly, erection, and stripping of gang forms.

Horizontal Formwork (15 Hours)
Trainee S20 978-0-13-378682-8
Instructor S20 978-0-13-378693-4
(Module ID 27309-14) Describes elevated decks and formwork systems and methods used in their construction. Covers joists, pans, and related hardware in steel-framed, wood-framed, and specialty form systems and provides instructions for the use of flying decks, as well as sharing and rehosting systems.
Carpentry Level 3 (continued)

Handling and Placing Concrete (20 Hours)
Instructor $20  ISBN 978-0-13-378694-1
(Module ID 27305-14) Covers tools, equipment, and procedures for safely handling, placing, and finishing concrete. Describes joints made in concrete structures and the use of joint sealants.

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

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

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

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

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

Introduction to Construction Equipment (7.5 Hours)
Instructor $20  ISBN 978-0-13-378718-4
(Module ID 27406-14) Introduces construction equipment, including the aerial lift, skid steer loader, electric power generator, compactor, compactor, and forklift. An overview of general safety, operation, and maintenance procedures is provided.

Introduction to Oxyfuel Cutting and Arc Welding (20 Elective Hours)
Instructor $20  ISBN 978-0-13-378719-1
(Module ID 27407-14) Introduces the equipment, procedures, and safety practices used in cutting steel with oxyfuel equipment, as well as shielded metal arc welding, gas-tungsten arc welding, and gas metal arc welding. Labs include practice in cutting and welding techniques.

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

Fundamentals of Crew Leadership (20 Hours)
Instructor $43  ISBN 978-0-13-378722-1
(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.

Cabinetmaking

Cabinetmaking

This module expands on the knowledge and skills gained through the Carpentry Curriculum and provides the basic information needed to construct and apply finishes to custom cabinetry. It identifies and discusses various types of wood products, wood-finishing techniques, power tools, cabinet doors, shelves, and hardware. Specific guidance is also provided for the installation of laminated countertops.

From the Ground Up

From the Ground Up

Revised: 2006, Second Edition
ISBN 978-0-13-229164-4
### Concrete Finishing

**MODULES**

L1: CONCRETE FINISHING

**Trainee** $20  
**Instructor** $20

- **Curriculum Notes**
  - 160 Hours (Includes 72.5 hours of Care 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.

#### MODULES

- **Introduction to Concrete Construction and Finishing** (10 Hours)
  - **Trainee** $20  
  - **Instructor** $20
  - (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)
  - **Trainee** $20  
  - **Instructor** $20
  - (Module ID 23102) Explains safety requirements for concrete construction and finishing. Provides information on OSHA requirements with regard to hazard communication, full 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.

- **Properties of Concrete** (10 Hours)
  - **Trainee** $20  
  - **Instructor** $20
  - (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)
  - **Trainee** $20  
  - **Instructor** $20
  - (Module ID 23104) Describes tools and equipment used in the production, placing, and curing of concrete. Explains safe operation and maintenance requirements. Provides opportunities for hand tool operation and demonstration of larger pieces of power equipment.

- **Preparing for Placement** (12.5 Hours)
  - **Trainee** $20  
  - **Instructor** $20
  - (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)
  - **Trainee** $20  
  - **Instructor** $20
  - (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.

- **Curing and Protecting Concrete** (5 Hours)
  - **Trainee** $20  
  - **Instructor** $20
  - (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)
  - **Trainee** $20  
  - **Instructor** $20
  - (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.

#### L2: CONCRETE FINISHING

**Trainee** $20  
**Instructor** $20

- **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.

#### MODULES

- **Properties of Concrete, Part Two** (10 Hours)
  - **Trainee** $20  
  - **Instructor** $20
  - (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.

- **Estimating Concrete Quantities** (10 Hours)
  - **Trainee** $20  
  - **Instructor** $20
  - (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)
  - **Trainee** $20  
  - **Instructor** $20
  - (Module ID 23203) Describes forming requirements. Includes types of forms, forming materials, use of release agents, form accessories, placement of anchors and embedments, and form removal. Highlights safety requirements with emphasis on restoring preforming and precautions.

- **Site Concrete** (20 Hours)
  - **Trainee** $20  
  - **Instructor** $20
  - (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)
  - **Trainee** $20  
  - **Instructor** $20
  - (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)
  - **Trainee** $20  
  - **Instructor** $20
  - (Module ID 23206) Discusses 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  
  - **Instructor** $20
  - (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)
  - **Trainee** $20  
  - **Instructor** $20
  - (Module ID 23208) Provides an overview of surface treatments applied to concrete structures. Includes the requirements for and application of dry shales, self-leveling toppings, epoxies, and shotcrete.

- **Quality Control** (10 Hours)
  - **Trainee** $20  
  - **Instructor** $20
  - (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.

- **Making Repairs** (10 Hours)
  - **Trainee** $20  
  - **Instructor** $20
  - (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

**L1 CONSTRUCTION CRAFT LABORER**

**Curriculum Notes**
- 172.5 Hours (Includes 80 hours of Core Curriculum, which is a prerequisite for Level 1 completion.)
- Updated: 2015, Third Edition
- Downloadable instructor resources that include module tests, PowerPoint®, and performance profile sheets are available at www.nccer.org/irc.

**PAPERBACK**
- Trade Bound Guide: $140
- Instructor Guide: $105

**HARDCOVER**
- Trade Bound Guide: $155
- Hardcover Instructor's Guide: $140

**Book Information**
- Updated: 2015, Third Edition
- 172.5 Hours (Includes 80 hours of Core Curriculum)
- Modules compiled from five existing NCCER programs.

**MODULES**
- **Introduction to Basic Rigging** (7.5 Hours) (Module ID 00106-15; from Core Curriculum)
- **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 Basic Rigging** (7.5 Hours) (Module ID 00106-15; from Core Curriculum)
- **Orientation to the Trade** (2.5 Hours) (Module ID 27101-13; from Carpentry Level One)
- **Introduction to Masonry** (12.5 Hours) (Module ID 27304-14; from Carpentry Level Three)
- **Reinforcing Concrete** (15 Hours) (Module ID 27304-14; from Carpentry Level Three)
- **Vertical Formwork** (22.5 Hours) (Module ID 27308-14; from Carpentry Level Three)
- **Horizontal Formwork** (15 Hours) (Module ID 27309-14; from Carpentry Level Three)
- **Heavy Equipment, Forklift, and Crane Safety** (5 Hours) (Module ID 75123-13; from Field Safety)
- **Steel Erection** (2.5 Hours) (Module ID 75110-13; from Field Safety)
- **Electrical Safety** (5 Hours) (Module ID 75121-13; from Field Safety)
- **Introduction to Construction Equipment** (7.5 Hours) (Module ID 27406-14; from 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**

**Curriculum Notes**
- **CONSTRUCTION TECHNOLOGY**
- This curriculum is ideal for programs formatted as Construction Cluster or Building Trades. It consists of modules compiled from five existing NCCER programs.
- 425 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.)
- Revised: 2016, Fourth Edition
- Downloadable instructor resources that include module tests, PowerPoint®, and performance profile sheets are available at www.nccer.org/irc.

**MODULES**
- **Introduction to Masonry** (12.5 Hours) (Module ID 28101-13; from Masonry Level One)
- **Masonry Units and Installation Techniques** (60 Hours) (Module ID 28105-13; from Masonry Level One)

- **Floor Systems** (27.5 Hours) (Module ID 27105-13; from Carpentry Level One)
- **Ceiling Joist and Roof Framing** (40 Hours) (Module ID 27112-13; Carpentry Level One)
- **Roofing Applications** (25 Hours) (Module ID 27202-13; from Carpentry Level Two)
- **Wall Systems** (20 Hours) (Module ID 27111-13; Carpentry Level One)
- **Exterior Finishing** (35 Hours) (Module ID 27204-13; from Carpentry Level Two)
- **Basic Stair Layout** (12.5 Hours) (Module ID 27410-13; from Carpentry Level One)
- **Electrical Safety** (10 Hours) (Module ID 26102-14; from Electrical Level One)
- **Residential Electrical Services** (15 Hours) (Module ID 26111-14; from Electrical Level One)
Construction Technology (continued)

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

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

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

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 Carpentry Level Two)

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

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Drywall

**L1 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**

**ISBN**

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

Instructor’s Guide: $67
978-0-13-604514-4

**MODULES**

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

**Orientation to the Trade** (5 Hours)
Trainee S20

Instructor S20

(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 S20

Instructor S20
ISBN 978-0-13-604851-0

(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 S20

Instructor S20

(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 S20
ISBN 978-0-13-604853-4

Instructor S20

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

**Drywall Finishing** (25 Hours)
Trainee S20
ISBN 978-0-13-604848-0

Instructor S20

(Module ID 45105-07) Covers the materials, tools, and methods used to finish and patch gypsum drywall, including automatic and manual taping tools.

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**L2 DRYWALL**

**LEVEL 2**

**Curriculum Notes**

- 145 Hours
- Published: 2009
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

**PAPERBACK**

**ISBN**

Trainee Guide: $97
978-0-13-604480-2

Instructor’s Guide: $97
978-0-13-604481-9

**MODULES**

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

**Thermal and Moisture Protection** (7.5 Hours)
Trainee S20

Instructor S20

(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 S20
ISBN 978-0-13-604853-4

Instructor S20

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

**Drywall Finishing** (25 Hours)
Trainee S20
ISBN 978-0-13-604848-0

Instructor S20

(Module ID 45105-07) Covers the materials, tools, and methods used to finish and patch gypsum drywall, including automatic and manual taping tools.

**Commercial Drawings** (25 Hours)
Trainee S20

Instructor S20

(Module ID 45201-09) Focuses on techniques for reading and using architectural and structural drawings and specifications.

**Steel Framing** (50 Hours)
Trainee S20

Instructor S20

(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)
Trainee S20

Instructor S20

(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.

**Interior Specialties** (15 Hours)
Trainee S20

Instructor S20

(Module ID 45204-09) Covers the composition and use of specialty interior finishing products, such as vinyl- and fabric-covered panels, wood wall and ceiling panels, and glass fiber-reinforced gypsum (GFRG) panels.

**Exterior Cladding** (20 Hours)
Trainee S20

Instructor S20

(Module ID 45205-09) Covers a variety of specialized exterior finish products, including EIFS, stucco, synthetic veneer stone, panelized cladding, and glass fiber-reinforced concrete (GFRC) panels.

**Specialty Finishes** (15 Hours)
Trainee S20

Instructor S20

(Module ID 45206-09) Covers the materials, tools, and application methods used for specialized interior finishes, such as sand, marble, clay, and Venetian plaster.
Electrical

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 hardware and systems used by an electrician to mount and support boxes, receptacles, and other electrical components. Also covers NEC® fill and pull requirements for device, pull, and junction boxes under 100 cubic inches.

Hand Bending (10 Hours)

Trainee $20  ISBN 978-0-13-480488-0
(Module ID 26107-17) Introduces conduit bending and installation. Covers the techniques for using hand-operated and step conduit benders, as well as cutting, reaming, and threading conduit.

Raceways and Fittings (20 Hours)

Trainee $20  ISBN 978-0-13-480491-0
(Module ID 26108-17) Introduces the types and applications of raceways, wireways, and ducts. Stresses the applicable NEC® requirements.

Conductors and Cables (10 Hours)

(Module ID 26109-17) Focuses on the types and applications of conductors and covers proper wiring techniques. Stresses the applicable NEC® requirements.

Basic Electrical Construction Drawings (7.5 Hours)

(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)

Trainee $20  ISBN 978-0-13-478339-0
(Module ID 26112-17) Covers proper selection, inspection, and use of common electrical test equipment, including voltage testers, clamp-on ammeters, multimeters, and data recording equipment. Also covers safety precautions and meter category ratings.

Conduit Bending (15 Hours)

Instructor $20 ISBN 978-0-13-478331-4
(Module ID 26203-17) Introduces principles of human vision and the characteristics of light. Focuses on the handling and installation of various types of lamps and lighting fixtures.

Pull and Junction Boxes (12.5 Hours)

(Module ID 26204-17) Covers conduit bends in conduit up to 6 inches. Focuses on mechanical, hydraulic, and electrical bends.

Conductor Installations (10 Hours)

(Module ID 26205-17) Explains how to select and size pull boxes, junction boxes, and handholes.

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

#### Modules

**Cable Tray** (7.5 Hours)

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<td>Instructor S20</td>
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(Module ID 26207-17) Focuses on NEC® installation requirements for cable tray, including cable installations.

**Conductor Terminations and Splices** (7.5 Hours)

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(Module ID 26208-17) Describes methods of terminating and splicing conductors, including preparing and tapping conductors.

**Grounding and Bonding** (15 Hours)

|-------------|-------------------------|

(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)

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<td>Instructor S20</td>
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(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)

|-------------|-------------------------|

(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
- 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 listed below are included in the Trainee Guide and the Instructor’s Guide. The following ISBN and pricing information is for ordering individual modules only.

**Load Calculations — Branch and Feeder Circuits** (7.5 Hours)


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

**Conductor Selection and Calculations** (15 Hours)

| Instructor S20 | ISBN 978-0-13-480521-4 |

(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 S20 | ISBN 978-0-13-480516-0 |

(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)

| Instructor S20 | ISBN 978-0-13-480517-7 |

(Module ID 26304-17) Presents the NEC® requirements for equipment installed in hazardous locations.

**Overcurrent Protection (25 Hours)**

| Instructor S20 | ISBN 978-0-13-480519-1 |

(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)


(Module ID 26306-17) Discusses switchboards and switchgear, including installation, grounding, and maintenance requirements. Includes a set of drawings.

**Transformers (12.5 Hours)**

| Instructor S20 | ISBN 978-0-13-480527-9 |

(Module ID 26307-17) Discusses transformer types, construction, connections, protection, and grounding.

**Commercial Electrical Services** (10 Hours)

| Instructor S20 | ISBN 978-0-13-480529-0 |

(Module ID 26308-17) Covers the components, installation considerations, and NEC® requirements for commercial services.

**Motor Calculations** (12.5 Hours)

| Instructor S20 | ISBN 978-0-13-480532-0 |

(Module ID 26309-17) Covers calculations required to size conductors and overcurrent protection for motor applications.

**Voice, Data, and Video** (10 Hours)


(Module ID 26311-17) Provides information on selecting, sizing, and installing motor controllers. Also covers control circuit pilot devices and basic relay logic.

**L4 ELECTRICAL**

#### Curriculum Notes

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

**PAPERBACK**

| Instructor’s Guide: | 978-0-13-480627-3 |

**MODULES**

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

**Load Calculations — Feeders and Services** (20 Hours)


(Module ID 26401-17) Topics include basic calculation procedures for commercial and residential applications.

**Health Care Facilities** (10 Hours)


(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)


(Module ID 26403-17) Explains the NEC® requirements for emergency generators and storage batteries.

**Basic Electronic Theory** (10 Hours)

| Instructor S20 | ISBN 978-0-13-480545-0 |

(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 S20 | ISBN 978-0-13-480547-4 |
| Instructor S20 | ISBN 978-0-13-480548-1 |

(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.

**Specialty Transformers** (10 Hours)

| Instructor S20 | ISBN 978-0-13-480550-4 |

(Module ID 26406-17) Covers various types of transformers and their applications. Also provides information on selecting, sizing, and installing these devices.

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www.nccer.org/instructors
Electrical Level 4 (continued)

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

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

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

Motor Operation and Maintenance (10 Hours)
Trainee $20  
Instructor $20  
_Module ID 26410-17_ Covers motor cleaning, testing, and preventive maintenance. Also describes basic troubleshooting procedures.

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

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

Fundamentals of Crew Leadership (22.5 Hours)
Trainee $43  
Instructor $43  
_Module ID 46101-17, Third 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.

Managing Electrical Hazards

COMING SOON!

12.5 Hours  
Updated: 2018, Fourth Edition  
_Module ID 26501-18_  

PAPERBACK  
Trainee Guide: $25  
Instructor’s Guide: $25  

• A copy of NFPA 70®, Standard for Electrical Safety in the Workplace, 2018 Edition, is required material for this course. To order, contact NFPA at www.nfpa.org or 1-800-344-3555.

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)
Trainee $20  
Instructor $20  
_Module ID 33103-10_ Reviews the materials and techniques used in constructing and finishing residential and commercial buildings, including concrete, brick and block, and post and beam. Covers common drills, bits, and techniques used to drill through concrete and steel. Also describes types of fasteners used with these materials.

Concrete and Steel Construction Methods
(12.5 Hours)
Trainee $20  
Instructor $20  
_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.

BINDER
Trainee Guide: S105  
Instructor’s Guide: S105  

Cable Selection  
Wiring and Cable Terminations  
CCTV Systems  
Access Control Systems  
Buses and Networks  
Fiber Optics  
Programmable Logic Controllers  
Broadband Systems  
Distributed Control Systems  
Intrusion Detection Systems  
Audio Systems  
Overview of Nurse Call and Signaling Systems

To Order Call: 1-800-922-0579  
www.nccer.org/instructors
Electronic Systems Technician Level 1 (continued)

Pathways and Spaces (12.5 Hours)
Instructor $20 ISBN 978-0-13-213759-1
(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)
Instructor $20 ISBN 978-0-13-213761-4
(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)
Instructor $20 ISBN 978-0-13-213762-1
(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)
Instructor $20 ISBN 978-0-13-213730-0
(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 33201-10) Introduces electrical concepts used in Ohm’s law as applied to DC series circuits. Describes atomic theory, electromotive 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.

Seminconductors and Integrated Circuits
(Module ID 33204-10) Introduces the principles of electronics and semiconductors, and components, and applications.

Test Equipment (10 Hours)
Instructor $20 ISBN 978-0-13-266169-0
(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. Emphasis on familiarization with and use of the NEC®.

Wire and Cable Terminations (25 Hours)
Instructor $20 ISBN 978-0-13-266174-4
(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)
Instructor $20 ISBN 978-0-13-266175-1
(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
LEVEL 3

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 ISBN
Trainee Guide: $97 978-0-13-257823-3
Instructor’s Guide: $97 978-0-13-266249-9
NCCERConnect Access Card: $97 978-0-13-424374-0

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

Buses and Networks (25 Hours)
Instructor $20 ISBN 978-0-13-266383-0
(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.

L2 ELECTRONIC SYSTEMS TECHNICIAN
LEVEL 2

Curriculum Notes
• 145 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 ISBN
Trainee Guide: $97 978-0-13-213712-6
Instructor’s Guide: $97 978-0-13-213713-3
NCCERConnect Access Card: $97 978-0-13-424365-8

MODELS
All of the modules listed below are included in the Trainee Guide and the Instructor’s Guide. The following ISBN and pricing information is for ordering individual modules only.
Electronic Systems Technician Level 3 (continued)

Wireless Communication (10 Hours)
Instructor $20  ISBN 978-0-13-266385-4
(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)
Instructor $20  ISBN 978-0-13-266386-1
(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)
(Module ID 46101-11, Second Edition) Covers basic leadership skills and explains different leadership styles, communication, delegating, and problem solving. Jobsite safety and the crew leader’s role in safety are discussed, as well as project planning, scheduling, and estimating. Includes performance tasks to assist the learning process.

Rack Assembly (17.5 Hours)
(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)
(Module ID 33306-11) Covers the final testing and checkout 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)
(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.

Electronics Fundamentals (20 Hours)
(Module ID 33308-11) Emphasizes codes and standards.

SYSTEMS TECHNICIAN LEVEL 4

L4 ELECTRONIC SYSTEMS TECHNICIAN

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

PAPERBACK

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

Audio Systems (30 Hours)
Instructor $20  ISBN 978-0-13-292267-8
(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)
(Module ID 33402-12) Describes the types of equipment used in various video systems and equipment, including both analog and digital video, video signaling, display devices, HDTV, 3-D video, and video processing and distribution.

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

Media Management Systems (20 Hours)
(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)
(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)
(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. Describes best practices for system interoperability and performance. Discusses various interconnection options and integration protocols.

Intrusion Detection Systems (30 Hours)
(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)
(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)
Instructor $20  ISBN 978-0-13-292276-0
(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)
Instructor $20  ISBN 978-0-13-292278-4
(Module ID 33410-12) Describes the installation and configuration of closed circuit TV systems for small, medium, and large facilities. Explains various equipment, including cameras, lenses, remote-positioning, video recording, and transmission. Covers the roles of the internet and digital technologies. Introduces test and troubleshooting equipment.

Access Control Systems (35 Hours)
Instructor $20  ISBN 978-0-13-292279-1
(Module ID 33411-12) Introduces access control systems, including applications, door locking systems, readers, biometrics, and controllers. Emphasizes installation practices as well as building and electrical codes.
Heavy Equipment Operations

**L1 HEAVY EQUIPMENT OPERATIONS**

**LEVEL 1**

**Curriculum Notes**
- 165 Total 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.)
- Revised: 2012, Third Edition
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

**MODULES**

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

**Orientation to the Trade** (5 Hours)
Trainee $20  
Instructor $20  
(Module ID 22101-12) Provides an overview of heavy equipment terminology, operations, operator responsibilities, career opportunities, and basic principles of safety.

**Heavy Equipment Safety** (10 Hours)
Trainee $20  
Instructor $20  
(Module ID 22102-12) Provides a comprehensive overview of safety requirements on job sites with emphasis on OSHA, MSHA, and NIOSH requirements. Presents basic requirements for personal protection, safe equipment operations and maintenance, and HAZCOM.

**Identification of Heavy Equipment** (5 Hours)
Trainee $20  
Instructor $20  
(Module ID 22103-12) Introduces the twelve most used pieces of heavy equipment. Describes the functional operation and uses for each piece of equipment, along with a general description of heavy equipment drive and hydraulic systems.

**Basic Operational Techniques** (27.5 Hours)
Trainee $20  
Instructor $20  
(Module ID 22104-12) Covers prestart checks of a machine’s hardware (frame, body panels, tires or tracks, and safety equipment), driveline components, hydraulic system components, electrical components, and controls. Reviews machine safety issues. Explains how to safely start, move, steer, stop, and shut down different types of machines.

**Utility Tractors** (17.5 Hours)
Trainee $20  
Instructor $20  
(Module ID 22105-12) Covers operation of general utility tractors in the construction industry. Describes duties and responsibilities of the operator, safety rules for operation, the attachment of implements, and basic preventive maintenance practices.

**Introduction to Earthmoving** (12.5 Hours)
Trainee $20  
Instructor $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  
Instructor $20  
(Module ID 22206-12) Introduces the concept of preparing graded surfaces using heavy equipment. Covers identification of construction stakes and interpretation of marks on each type of stake. Describes the process for grading slopes.

**L2 HEAVY EQUIPMENT OPERATIONS**

**LEVEL 2**

**Curriculum Notes**
- 167.5 Hours
- Revised: 2013, Third Edition
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

**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.

**Rough Terrain Forklifts** (22.5 Hours)
Trainee $20  
Instructor $20  
(Module ID 22206-13) Covers the uses of forklifts on construction sites. Includes instructions for lifting, transporting, and placing various types of loads, as well as safety, operation, and maintenance procedures.

**On-Road Dump Trucks** (20 Hours)
Trainee $20  
Instructor $20  
(Module ID 22202-13) Covers uses, inspection, startup, shutdown, operator maintenance, and operation of dump trucks used to carry loads on public highways. Includes operation of dump trucks in normal and emergency situations.
Stay Connected:

Heavy Equipment Operations Level 3

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.

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

Backhoes (30 Hours)
Trainee $20
Instructor $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
Instructor $20
(Module ID 22301-14) Identifies and describes the common uses, types, 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
Instructor $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 (35 Hours)
Trainee $20
Instructor $20
(Module ID 22304-14) Identifies and describes the common types, uses, and components 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
Instructor $20
(Module ID 22305-14) Identifies and describes the common uses and types of motor graders. Presents safety guidelines, prestart inspection procedures, and preventive maintenance requirements. Describes basic startup and operation, and covers common work activities associated with motor graders.

Soils (10 Hours)
Trainee $20
Instructor $20
(Module ID 22108-13; from Heavy Equipment Operations Level Two) Covers the identification of soil types and their uses in construction.

Site Work (20 Hours)
Trainee $20
Instructor $20
(Module ID 22210-13; from Heavy Equipment Operations Level Two) Covers site preparation and the use of heavy equipment in site work.

Excavation Math (17.5 Hours)
Trainee $20
Instructor $20
(Module ID 22207-13; from Heavy Equipment Operations Level Two) Covers basic math skills needed in excavation work.

Interpreting Civil Drawings (20 Hours)
Trainee $20
Instructor $20
(Module ID 22209-13; from Heavy Equipment Operations Level Two) Covers the interpretation of civil drawings for excavation work.

To Order Call: 1-800-922-0579
www.nccer.org/instructors
Heavy Highway Level 2

Rigging Practices (15 Hours)
(Module ID 38102-18; from Basic Rigger)

Crane Safety and Emergency Procedures (25 Hours)
(Module ID 21106-18; from Mobile Crane Operations, Level One)
Instructor $20  ISBN 978-0-13-498819-1

Basic Principles of Cranes (15 Hours)
(Module ID 21102-18; from Mobile Crane Operations, Level One)

Crane Communications (10 Hours)
(Module ID 53101-18; from Signal Person)

Finishing and Grading (25 Hours)
(Module ID 22307-14; from Heavy Equipment Operations Level Three)

Trenching and Excavating (15 Hours)
(Module ID 27306-14; from Carpentry Level Three)

Plant Operations (7.5 Hours)
Instructor $20  ISBN 978-0-13-448583-6

Paving (12.5 Hours)
Instructor $20  ISBN 978-0-13-448585-0

Bridge Foundations (20 Hours)
Instructor $20  ISBN 978-0-13-448591-1

Bridge Formwork (22.5 Hours)

Structural Ironworking One (7.5 Hours)
(Module ID 30109-11; from Ironworking Level One)
Instructor $20  ISBN 978-0-13-215122-1

Bridge Construction (20 Hours)
Instructor $20  ISBN 978-0-13-448587-4

Crane Communications

• Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.
• For more information, visit www.nccer.org/book-updates.

Hydroblasting

Trainee Guide: $22  978-0-13-294870-8
Instructor’s Guide: $22  978-0-13-294880-9

Includes the newest waterjet safety technologies, methods, and equipment. Also provides expanded information on shrouds, shielding, chocking, and grounding.
### HVAC

#### LEVEL 1

**Curriculum Notes**
- 192.5 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: 2013, Fourth Edition
- NATE-Recognized Training Provider
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

**PAPERBACK**

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**New HVAC Levels 1-4, 5th Edition will be coming out this summer. For ordering information, visit www.nccer.org/book-updates.**

#### 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 HVAC** (7.5 Hours)
- Trainee $20
- Instructor $20

(Module ID 03101-13) Covers the basics of air conditioning and refrigeration, 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
- Instructor $20

(Module ID 03102-13) Covers the basics of HVAC/R, including 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
- Instructor $20

(Module ID 03106-13) Introduces the concepts 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
- Instructor $20

(Module ID 03108-13) Covers the fundamentals of heating systems and the combustion process. Provides different types and designs of gas furnaces and their components, as well as basic control concepts for their installation and service.

**Introduction to Cooling** (30 Hours)
- Trainee $20
- Instructor $20
- ISBN 978-0-13-340353-4

(Module ID 03109-13) Describes the factors related to air movement and its measurement in common air distribution systems. Presents the required mechanical equipment and materials used in common assembly and installation practices.

**Introduction to Air Distribution Systems** (15 Hours)
- Trainee $20
- Instructor $20

(Module ID 03104-13) Covers the fundamentals of heating systems and the combustion process. Provides different types and designs of gas furnaces and their components, as well as basic control concepts for their installation and service.

**Basic Copper and Plastic Piping Practices** (10 Hours)
- Trainee $20
- Instructor $20

(Module ID 03103-13) Explains how to identify types of copper tubing and fittings used in HVAC/R systems 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
- Instructor $20

(Module ID 03104-13) Covers the equipment, techniques, and materials used to safely join copper tubing through both soldering and brazing. Covers the required personal protective equipment, preparation, and work processes in detail. Also provides the procedures for brazing copper to dissimilar materials.

**Basic Carbon Steel Piping Practices** (10 Hours)
- Trainee $20
- Instructor $20

(Module ID 03105-13) Covers 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.

**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.

#### LEVEL 2

**Curriculum Notes**
- 170 Hours
- Revised: 2013, Fourth Edition
- NATE-Recognized Training Provider
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

**PAPERBACK**

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**New HVAC Levels 1-4, 5th Edition will be coming out this summer. For ordering information, visit www.nccer.org/book-updates.**

#### 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.

**Alternating Current** (10 Hours)
- Trainee $20
- Instructor $20

(Module ID 03206-13) Covers transformers, single-phase and three-phase power distribution, capacitors, the theory and operation of induction motors, and the instruments and techniques used in testing AC circuits and components. Also reviews electrical safety.

**Compressors** (12.5 Hours)
- Trainee $20
- Instructor $20

(Module ID 03302-13) Explains operating principles of compressors used in comfort air conditioning and refrigeration systems. Includes installation, service, and repair procedures.
HVAC Level 2 (continued)

Refrigerants and Oils (12.5 Hours)
(Module ID 03301-13) Covers characteristics and applications of pure and blended refrigerants, and provides extensive coverage of lubricating oils used in refrigeration systems.

Leak Detection, Evacuation, Recovery, and Charging (30 Hours)
(Module ID 03205-13) Covers refrigerant handling and equipment servicing procedures for HVAC systems in an environmentally safe manner.

Metering Devices (12.5 Hours)
(Module ID 03303-13) Covers the operating principles, applications, installation, and adjustment of fixed and adjustable expansion devices used in air conditioning equipment.

Heat Pumps (20 Hours)
Instructor $20 ISBN 978-0-13-378013-0
(Module ID 03211-13) 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 03315-13) Delivers information and skills needed to troubleshoot and repair zoned, ductless, and variable refrigerant flow systems.

Chimneys, Vents, and Flues (5 Hours)
Instructor $20 ISBN 978-0-13-382270-0
(Module ID 03320-13) Covers the principles of venting fossil fuel furnaces and methods for selecting and installing vent systems for gas-fired heating equipment.

Sheet Metal Duct Systems (10 Hours)
(Module ID 03321-13) Covers layout, fabrication, installation, and insulation of sheet metal ductwork. Also includes selection and installation of registers, diffusers, dampers, and other duct accessories.

Fiberglass and Flexible Duct Systems (7.5 Hours)
Instructor $20 ISBN 978-0-13-382272-4
(Module ID 03324-13) Covers the layout, fabrication, installation, and joining of fiberglass ductwork and fittings. Describes the proper methods for attaching and supporting flex duct.

Commercial Airside Systems (12.5 Hours)
Instructor $20 ISBN 978-0-13-382273-1
(Module ID 03301-13) Discusses 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)
Instructor $20 ISBN 978-0-13-382274-8
(Module ID 03204-13) 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 (12.5 Hours)
(Module ID 03203-13) Introduces hot water heating systems, focusing on safe operation of the low-pressure boilers and piping systems in residential applications.

Commercial Hydronic Systems (10 Hours)
(Module ID 03210-13) Provides guidance related to troubleshooting cooling systems.

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

Troubleshooting Gas Heating (12.5 Hours)
(Module ID 03310-13) 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 Oil Heating (12.5 Hours)
(Module ID 03312-13) Delivers information and skills needed to troubleshoot various air treatment accessories used with heating and cooling equipment.

Commercial Hydronic Systems (10 Hours)
(Module ID 03315-13) Provides a thorough review of the heat pump operating cycle, and presents troubleshooting procedures for components.

Zoning, Ductless, and Variable Refrigerant Flow Systems (12.5 Hours)
Instructor $20 ISBN 978-0-13-378138-0
(Module ID 03305-13) 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 03306-13) 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)
(Module ID 03304-13) Covers the applications, principles, and troubleshooting of retail refrigeration systems.

Customer Relations (5 Hours)
(Module ID 03316-13) 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.

Energy Conservation Equipment (7.5 Hours)
(Module ID 03404-13) 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)
(Module ID 03405-13) 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)
Instructor $20  ISBN 978-0-13-378169-4
(Module ID 03402-13) 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)
Instructor $20  ISBN 978-0-13-378170-0
(Module ID 03406-13) Presents the procedures for the startup and shutdown of hot water, steam heating, chilled water, and air handling systems. Also covers the start-up 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)
(Module ID 03401-13) 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)
Instructor $20  ISBN 978-0-13-378172-4
(Module ID 03407-13) 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)
(Module ID 03408-13) 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 dehfst systems are covered in detail.

Alternative and Specialized Heating and Cooling Systems (10 Hours)
(Module ID 03409-13) 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 (20 Hours)
(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.

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 gases, it’s 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.

GREEN TOPICS IN HVAC

To Order Call: 1-800-922-0579 Stay Connected: www.nccer.org/instructors
Industrial Coating and Lining Application Specialist

Coating Application (105 Hours)
Trainee $20  
Instructor $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  
Instructor $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 Two (80 Hours)
Trainee $20  
Instructor $20  
(Module ID 69102-09) Explains how to follow and execute a work plan. Covers area and ratio calculations and explains how to determine VOC ratios when adding thickeners. Explains the effects of pressure, volume, and temperature on surface preparation and application.

Coating Applications Two (100 Hours)
Trainee $20  
Instructor $20  
ISBN 978-0-13-604800-8  
(Module ID 69201-10) Discusses the physical properties of various coatings, including convertible and nonconvertible types. Also covers basic curing mechanisms and methods of film formation.

Work Planning and Quality Control (25 Hours)
Trainee $20  
Instructor $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 thickeners. Explains the effects of pressure, volume, and temperature on surface preparation and application.

Surface Preparation One (45 Hours)
Trainee $20  
Instructor $20  
ISBN 978-0-13-604840-4  
(Module ID 69204-10) Describes the types of containment appropriate to various coating and surface preparation applications, including standards and verification. Also covers containment erection and repair.

Surface Preparation One (50 Hours)
Trainee $20  
Instructor $20  
(Module ID 69205-10) Discusses the physical properties of various coatings, including convertible and nonconvertible types. Also covers basic curing mechanisms and methods of film formation.

Coating Applications One (70 Hours)
Trainee $20  
Instructor $20  
(Module ID 69206-10) Discusses the setup, maintenance, and disassembly of conventional air spray, airless spray, air-assisted airless spray, and HVLP spraying, including testing and documentation. Also covers overcoating and explains how to use wet and dry film thickness gauges.

Curriculum Notes
- 307.5 Hours
- Published: 2009
- Core Curriculum is not a prerequisite for Industrial Coatings and Lining Application Specialist.
- Downloadable instructor resources that include module tests, PowerPoint ®, and performance profile sheets are available at www.nccer.org/irc.
INDUSTRIAL MAINTENANCE ELECTRICAL & INSTRUMENTATION TECHNICIAN

**MODULES**

**Orientation to the Trade** (2.5 Hours)
- Trainee S20
- Instructor S20
  (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)
- Trainee S20
- Instructor S20
  (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)
- Trainee S20
- Instructor S20
  (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)
- Trainee S20
- Instructor S20
  (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)
- Trainee S20
- Instructor S20
  (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)
- Trainee S20
- Instructor S20
  - ISBN 978-0-13-614597-4
  (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)
- Trainee S20
- Instructor S20
  (Module ID 40107-07) Introduces plot plans, structural drawings, elevation drawings, as-built drawings, equipment arrangement drawings, P&IDs, isometric drawings, basic circuit diagrams, and detail sheets.

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

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

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

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

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

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

**Industrial Safety for E&I Technicians** (12.5 Hours)
- Trainee S20
- Instructor S20
  (Module ID 40201-08) Covers safety rules and regulations for electrical workers, precautions for electrical hazards on the job, and the OSHA-mandated lockout/tagout procedure.

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

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

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

**E&I Test Equipment** (10 Hours)
- Trainee S20
- Instructor S20
  (Module ID 40205-08) Focuses on proper selection, inspection, and use of common electrical and instrumentation test equipment, including voltage testers, clamp-on ammeters, ohmmeters, multimeters, phase/motor rotation testers, data recording equipment, field communicators, pressure testers, and dead weight testers. Also covers safety precautions and meter category ratings.
Trainee $20
Instructor $20
(Module ID 40207-08) Covers measurement of mass, weight, pressure, temperature, and flow, conversion of units, and their application to industrial maintenance.

Hand Bending (10 Hours)
Trainee $20
Instructor $20
(Module ID 40208-08) Introduces conduit bending and installation. Covers the techniques for using hand-operated and step conduit benders, as well as cutting, reaming, and threading conduit.

Tubing (15 Hours)
Trainee $20
Instructor $20
(Module ID 40209-08) Introduces a variety of tubing, tubing materials, tools, and work practices. Covers proper storage and handling, cutting, deburring, reaming, bending, and flaring of tubing.

Clean, Purge, and Test Tubing and Piping Systems (7.5 Hours)
Trainee $20
Instructor $20
(Module ID 40210-08) Introduces proper storage and handling, cutting, deburring, reaming, bending, and flaring of tubing.

Instrument Drawings and Documents, Part One (15 Hours)
Trainee $20
Instructor $20
(Module ID 40211-08) Introduces rockers, symbols, abbreviations, and drawings and documents, including instrument indexes, installation detail drawings, location drawings, and control loops.

Conductors and Cables (10 Hours)
Trainee $20
Instructor $20
(Module ID 40212-08) Focuses on the types and applications of conductors and electrical cabling and covers proper wiring techniques. Stress the applicable NEC® requirements.

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

Flow, Pressure, Level, and Temperature (15 Hours)
Trainee $20
Instructor $20
(Module ID 40214-08) Describes methods of terminating and splicing conductors of all types and sizes, including preparing and taping conductors.

Process Mathematics (15 Hours)
Trainee $20
Instructor $20
(Module ID 40207-08) Covers measurement of mass, weight, pressure, temperature, and flow, conversion of units, and their application to industrial maintenance.

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Instructor $20
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Tubing (15 Hours)
Trainee $20
Instructor $20
(Module ID 40209-08) Introduces a variety of tubing, tubing materials, tools, and work practices. Covers proper storage and handling, cutting, deburring, reaming, bending, and flaring of tubing.

Clean, Purge, and Test Tubing and Piping Systems (7.5 Hours)
Trainee $20
Instructor $20
(Module ID 40210-08) Introduces proper storage and handling, cutting, deburring, reaming, bending, and flaring of tubing.

Instrument Drawings and Documents, Part One (15 Hours)
Trainee $20
Instructor $20
(Module ID 40211-08) Introduces rockers, symbols, abbreviations, and drawings and documents, including instrument indexes, installation detail drawings, location drawings, and control loops.

Conductors and Cables (10 Hours)
Trainee $20
Instructor $20
(Module ID 40212-08) Focuses on the types and applications of conductors and electrical cabling and covers proper wiring techniques. Stress the applicable NEC® requirements.

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

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Instrument Drawings and Documents, Part One (15 Hours)
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Instructor $20
(Module ID 40211-08) Introduces rockers, symbols, abbreviations, and drawings and documents, including instrument indexes, installation detail drawings, location drawings, and control loops.

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Trainee $20
Instructor $20
(Module ID 40212-08) Focuses on the types and applications of conductors and electrical cabling and covers proper wiring techniques. Stress the applicable NEC® requirements.

Conductor Terminations and Splices (10 Hours)
Trainee $20
Instructor $20
(Module ID 40213-08) Describes methods of terminating and splicing conductors of all types and sizes, including preparing and taping conductors.
MODULES
All of the modules listed below are included in the Trainee Guide and the Instructor’s Guide. The following ISBN and pricing information is for ordering individual modules only.

Standby and Emergency Systems (12.5 Hours)
- Trainee Guide: $97
- Instructor Guide: $20

Troubleshooting and Commissioning a Loop (10 Hours)
- Trainee Guide: $97
- Instructor Guide: $20

Instrumentation Calibration and Configuration (10 Hours)
- Trainee Guide: $97
- Instructor Guide: $20

Pneumatic Control Valves, Actuators, and Positioners (40 Hours)
- Trainee Guide: $97
- Instructor Guide: $20

Distributed Control Systems (10 Hours)
- Trainee Guide: $97
- Instructor Guide: $20

Process Control Loops and Tuning (20 Hours)
- Trainee Guide: $97
- Instructor Guide: $20

Programmable Logic Controllers (17.5 Hours)
- Trainee Guide: $97
- Instructor Guide: $20
- ISBN 978-0-13-609137-0

Data Networks (15 Hours)
- Trainee Guide: $97
- Instructor Guide: $20

Diagnostics and Instrumentation Maintenance (5 Hours)
- Trainee Guide: $97
- Instructor Guide: $20

Fasteners and Anchors (5 Hours)
- Trainee Guide: $97
- Instructor Guide: $20

Oxyfuel Cutting (17.5 Hours)
- Trainee Guide: $97
- Instructor Guide: $20

Gaskets and Packing (10 Hours)
- Trainee Guide: $97
- Instructor Guide: $20

Industrial Maintenance Mechanic (L1)

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

Orientation to the Trade (2.5 Hours)
- Trainee Guide: $67
- Instructor Guide: $67

Tools of the Trade (5 Hours)
- Trainee Guide: $67
- Instructor Guide: $67

Curriculum Notes
- 195 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: 2007, Third Edition
- Downloadable instructor resources that include module tests, PowerPoint ®, and performance profile sheets are available at www.nccer.org/irc.
Craft-Related Mathematics (15 Hours)
Trainee $20
Instructor $20
(Module ID 32106-07) Explains how to use ratios and proportions, solve basic algebra, area, volume, and circumference problems, and solve for right triangles using the Pythagorean theorem.

Construction Drawings (12.5 Hours)
Trainee $20
Instructor $20
(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)
Trainee $20
Instructor $20
(Module ID 32108-07) Explains centrifugal, rotary, reciprocating, metering, and vacuum pump operation and installation methods, as well as types of drivers. Describes net positive suction head and cavitation.

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

Introduction to Test Instruments (7.5 Hours)
Trainee $20
Instructor $20
(ISBN 978-0-13-614607-0)
(Module ID 32110-07) Introduces test equipment for industrial maintenance, including tachometers, pyrometers, strahe meters, voltage testers, and automated diagnostic tools.

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

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

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

L2  INDUSTRIAL MAINTENANCE MECHANIC

LEVEL 2

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

**PAPERBACK**
- Instructor’s Guide: $97
- Trainee Guide: $97

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

**Basic Layout** (20 Hours)
Trainee $20
Instructor $20
(Module ID 32201-07) Discusses the tools used in layout. Explains how to lay out baselines using the arc method and 3-4-5 method.

**Introduction to Piping Components** (5 Hours)
Trainee $20
Instructor $20
(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)
Trainee $20
Instructor $20
(Module ID 32203-07) Covers the selection, preparation, joining, and support of copper and plastic piping and fittings.

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

**Identify, Install, and Maintain Valves** (10 Hours)
Trainee $20
Instructor $20
(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 replace a valve stuffing box. Also discusses the purpose of valve packing.

**Hydrostatic and Pneumatic Testing** (10 Hours)
Trainee $20
Instructor $20
(Module ID 32206-07) Describes non-destructive and pressure testing of systems and equipment.

**Introduction to Bearings** (15 Hours)
Trainee $20
Instructor $20
(Module ID 32207-07) Introduces plain, ball, roller, thrust, guide, flanged, pillow block, and takeup bearings. Discusses bearing materials and designations.

L3  INDUSTRIAL MAINTENANCE MECHANIC

LEVEL 3

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

**PAPERBACK**
- Trainee Guide: $97
- Instructor’s Guide: $97

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

**Advanced Trade Math** (30 Hours)
Trainee $20
Instructor $20
(Module ID 32301-08) Explains right triangle trigonometry and its use in the trade. Also covers interpolation, equilateral and isosceles triangles and the laws of acute triangles.

**Precision Measuring Tools** (20 Hours)
Trainee $20
Instructor $20
(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.
Industrial Maintenance Mechanic Level 3 (continued)

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

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

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

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.

Advanced Topics

Advanced Towers and Vessels (15 Hours)
(Module ID 32501-09) Introduces the basics of reactor and refinery processes, including cat crackers, vacuum, and distillation. Also teaches the use of hydraulic torquing and tensioning equipment.

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

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 $20  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) Explains how to inspect, troubleshoot, disassemble, assemble, and install a pump. Also describes the process of preparing for startup.

Troubleshooting and Repairing Gearboxes (20 Hours)
(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 Pumps (10 Hours)
Trainee $20  ISBN 978-0-13-610452-0
(Module ID 32407-09) Explains how to inspect, troubleshoot, disassemble, assemble, and install a pump. Also describes the process of preparing for startup.

Troubleshooting and Repairing Gearboxes (20 Hours)
(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.
Instrumentation

L1 INSTRUMENTATION LEVEL 1

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

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

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

Instrumentation Safety Practices (12.5 Hours)
Trainee $20 978-0-13-378832-7
Instructor $20 978-0-13-378857-7
(Module ID 12115-14) Covers basic concepts of the hazard found on the job and teaches OSHA-mandated lockout/tagout procedure. Identifies safety practices related to hazardous tools and materials.

Hand and Power Tools for Instrumentation (12.5 Hours)
Trainee $20 978-0-13-378834-1
Instructor $20 978-0-13-378859-4
(Module ID 12114-14) Explains how to identify, inspect, use, and maintain the various hand and power tools used by instrument fitters and technicians.

Craft-Related Mathematics (10 Hours)
Trainee $20 978-0-13-378838-9
Instructor $20 978-0-13-378861-7
(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 $20 978-0-13-378839-6
Instructor $20 978-0-13-378862-4
(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 $20 978-0-13-378840-2
Instructor $20 978-0-13-378863-1
(Module ID 12304-14) Covers the methods used in receiving, inspecting, handling, and storing project-related instrumentation equipment.

Instrument Drawings and Documents Part Two (12.5 Hours)
Trainee $20 978-0-13-378844-0
Instructor $20 978-0-13-378867-9
(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 $20 978-0-13-378853-2
Instructor $20 978-0-13-378868-6
(Module ID 12111-14) Introduces tubes 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 $20 978-0-13-378854-9
Instructor $20 978-0-13-378869-3
(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 threading pipe.

Hoses (7.5 Hours)
Trainee $20 978-0-13-378856-3
Instructor $20 978-0-13-378870-9
(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.

L2 INSTRUMENTATION LEVEL 2

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

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

Electrical Systems for Instrumentation (12.5 Hours)
Trainee $20 978-0-13-378841-9
Instructor $20 978-0-13-378864-8
(Module ID 12116-14) Covers basic electrical concepts and terms, DC circuit calculations, electrical measuring instruments, and electrical wiring.

Fasteners (7.5 Hours)
Trainee $20 978-0-13-378842-6
Instructor $20 978-0-13-378865-5
(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 $20 978-0-13-378843-3
Instructor $20 978-0-13-378866-2
(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 $20 978-0-13-378844-0
Instructor $20 978-0-13-378867-9
(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.

Clean, Purge, and Test Tubing and Piping (15 Hours)
Trainee $20 978-0-13-378845-8
Instructor $20 978-0-13-378868-6
(Module ID 12111-14) Introduces tubes of tubing, tubing materials, fittings, and tools. Covers proper storage and handling, cutting, deburring, reaming, bending, and joining of tubing.

Tubing (15 Hours)
Trainee $20 978-0-13-378853-2
Instructor $20 978-0-13-378868-6
(Module ID 12111-14) Introduces tubes 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 $20 978-0-13-378854-9
Instructor $20 978-0-13-378869-3
(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 threading pipe.

Hoses (7.5 Hours)
Trainee $20 978-0-13-378856-3
Instructor $20 978-0-13-378870-9
(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.

Temperature, Pressure, Level, and Flow (15 Hours)
Trainee $20 978-0-13-448255-2
Instructor $20 978-0-13-448273-6
(Module ID 12110-15) Covers the methods used in receiving, inspecting, handling, and storing project-related instrumentation equipment.

Instrument Fitter’s Math (15 Hours)
Trainee $20 978-0-13-448257-6
Instructor $20 978-0-13-448258-3
(Module ID 12301-15) Explains how to use a scientific calculator in applying instrumentation piping and fitting math.

Instrument Drawings and Documents, Part Two (17.5 Hours)
Trainee $20 978-0-13-448260-6
Instructor $20 978-0-13-448259-0
(Module ID 12202-15) Covers reading and interpreting piping and instrumentation drawings, loop sheets, flow diagrams, isometrics, and orthographics to enable the identification of types of instrumentation and the specifications for installation.

Test Equipment (10 Hours)
Trainee $20 978-0-13-448265-3
Instructor $20 978-0-13-448264-0
(Module ID 33205-10; from Electronic Systems Technician Level 2)

Panel-Mounted Instruments (10 Hours)
Trainee $20 978-0-13-266158-4
Instructor $20 978-0-13-266169-0
(Module ID 12216-15) Explains the selection of instruments to be panel-mounted, locating the instruments using drawings, and procedures for installing the instruments in the panels.

Installing Field-Mounted Instruments (25 Hours)
Trainee $20 978-0-13-448263-7
Instructor $20 978-0-13-448265-1
(Module ID 12213-15) Covers selection and mounting of instruments at locations other than panels, including stand mounting, in-line mounting, structure mounting, strap mounting, and insertion mounting.

Raceways for Instrumentation (17.5 Hours)
Trainee $20 978-0-13-448267-5
Instructor $20 978-0-13-448264-4
(Module ID 12214-15) Introduces raceways. Also covers identification and selection of conduit, raceways, wireways, cable trays, fittings, and NEC® requirements for installation.

Clean, Purge, and Test Tubing and Piping Systems (10 Hours)
Trainee $20 978-0-13-448296-8
Instructor $20 978-0-13-448264-8
(Module ID 12303-15) Presents safe methods for cleaning, purging, blowing down, pressure testing, and leak testing tubing, piping, and hoses used in instrumentation.
Protective Measures for Instrumentation (20 Hours)
(Module ID 12308-15) Covers protective measures applied in instrumentation installations, including heat tracing, chemical treatment, and insulation.

Layout and Installation of Tubing and Piping Systems (35 Hours)
(Module ID 12302-15) Introduces piping and tubing layout procedures. Explains the steps in creating a hand-sketched isometric drawing that can be applied in the piping and tubing installation. Introduces methods and procedures used to measure, cut, and bend and support piping and tubing.

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

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

Relays and Timers (10 Hours)
(Module ID 12208-16) Presents the principles of operation and applications of various relays and timers. Also reviews the selection process for these devices.

Switches and Photocell Devices (10 Hours)
(Module ID 12209-16) Covers the principles of operation and applications of switches and photocell devices in the instrumentation environment.

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

Grounding and Shielding of Instrumentation Wiring (10 Hours)
Trainee $20  ISBN 978-0-13-448291-0
Instructor $20  ISBN 978-0-13-448293-4
(Module ID 12206-16) Teaches the basic concepts of grounding and shielding, including wire and cable identification. Defines various types of noise that can be induced into instrumentation wiring and describes the methods used to reduce or eliminate it.

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

Contingency Plans for Instrumentation (4.5 Hours)
(Module ID 12206-16) Covers the theory of operation and the application of common process controllers, including both pneumatic and electronic devices.

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Ironworking

Mobile Construction Cranes (10 Hours)
Traine $20
Instructor $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)
Traine $20
Instructor $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)
Traine $20
Instructor $20
(Module ID 30107-11) Identifies the site and environmental conditions contributing to successful employment. Describes the effects of load and foundation failures. Explains the proper use of manual and power tools. Identifies power sources for fabricating and erecting steel structures. Describes the safe use of manual and power tools. Explains the safe use of personal protective equipment. Describes the safe use of equipment and hardware used in rigging. Describes the selection and inspection of rigging equipment, including block and tackles, chain hoists, come-alongs, jacks, and tuggers.

Trade Drawings One (12.5 Hours)
Traine $20
Instructor $20
(Module ID 30108-11) Identifies the safety hazards associated with rigging. Explains how to prepare equipment for routine lifts and identify the components of a lift plan. Describes how to perform sling tension calculations and determine the weight of beams and basic weight estimation.

Trade Math (25 Hours)
Traine $20
Instructor $20
(Module ID 30201-11) Explains how to prepare equipment for routine lifts and identify the components of a lift plan. Describes how to perform sling tension calculations and determine the weight of beams and basic weight estimation.

Metal Decking (10 Hours)
Traine $20
Instructor $20
(Module ID 30114-11) Identifies decking types and profiles and how decking is packaged, shipped, and stored. Describes the effects of deck penetrations and damage. Discusses the effects of deck penetrations and damage. Discusses the effects of deck penetrations and damage. Discusses the effects of deck penetrations and damage. Discusses the effects of deck penetrations and damage.

Field Fabrication (15 Hours)
Traine $20
Instructor $20
(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.

Position Arc Welding (20 Hours)
Traine $20
Instructor $20
(Module ID 30202-11) Identifies and explains weld joints, weld positions, and open V-butt welds. Describes how to prepare arc welding equipment and how to make flat welds, horizontal welds, vertical welds, and overhead welds.

FASTENING

(5 Hours)
Traine $20
Instructor $20
(Module ID 30104-11) Identifies and explains weld joints, weld positions, and open V-butt welds. Describes how to prepare arc welding equipment and how to make flat welds, horizontal welds, vertical welds, and overhead welds.
**Ironworking Level 2 (continued)**

**Forklifts** (17.5 Hours)
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- **Instructor** $20  
  
  **Precast/Tilt-Up Erection** (12.5 Hours)
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- **Instructor** $20  
  
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- **Instructor** $20  
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**L3 IRONWORKING**

**MODULES**

- All of the modules listed below are included in the Trainee Guide and the Instructor’s Guide. The following ISBN and pricing information is for ordering individual modules only.
- **Applied Trade Math** (40 Hours)
  - **Trainee** $20  
  - **Instructor** $20  
    ISBN 978-0-13-292289-0
  
  **Flux Core for Ironworking** (40 Hours)
  - **Trainee** $20  
  - **Instructor** $20  

**PAPERBACK**

- **Trainee Guide**: $97  
- **Instructor’s Guide**: $97  

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• Revised: 2013, Fourth Edition
• Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.
• A Spanish translation of the third 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.

**Introduction to Masonry** (12.5 Hours)
Trainee S20 ISBN 978-0-13-377930-1
(Module ID 28101-13) Covers basic masonry materials, tools, techniques, and safety precautions. Explains how to select masonry materials and properly work with them. Focuses on using personal protective equipment, working safely from elevated surfaces, properly using masonry tools and equipment, and handling masonry materials safely.

**Masonry Safety** (15 Hours)
Instructor S20 ISBN 978-0-13-377937-0
(Module ID 28104-13) 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)
Instructor S20 ISBN 978-0-13-377939-4
(Module ID 28102-13) Provides instructions for assembling and disassembling scaffolds.

**Measurements, Drawings, and Specifications** (10 Hours)
Instructor S20 ISBN 978-0-13-377940-0
(Module ID 28103-13) Describes the calculation of distances and areas common in masonry work; describes the information found on residential construction drawings; and explores the role of specifications, standards, and codes.

**Mortar** (10 Hours)
Instructor S20 ISBN 978-0-13-377941-7
(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)
Instructor S20 ISBN 978-0-13-377942-4
(Module ID 28105-13) Covers characteristics of block and brick; 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.

**Residential Plans and Drawing Interpretation** (12.5 Hours)
Instructor S20 ISBN 978-0-13-382525-1
(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 drawings, dimensions and scaling, and estimating materials quantities from information on the plans.

**Residential Masonry** (25 Hours)
Instructor S20 ISBN 978-0-13-382526-8
(Module ID 28202-14) Covers the construction techniques for residential and small structure foundations, steps, patios, decks, chimneys, and fireplaces. Describes work activities that the mason must perform, as well as those that tie into the masonry work.

**Reinforced Masonry** (20 Hours)
(Module ID 28203-14) Focuses on the use of grout and other types of reinforcement, such as reinforcing steel, to strengthen and support masonry structures. Describes the locations where grout can be used and the techniques for placement. Discusses the use and application of various types of reinforced masonry elements, such as rebar and bond beam lintels.

**Masonry Openings and Metalwork** (20 Hours)
(Module ID 28204-14) Introduces types of metal components, including metal rods, joint reinforcements, plates, anchors, fasteners, and hollow metal frames for doors and windows, and explains how they are installed.

**Advanced Laying Techniques** (40 Hours)
Instructor S20 ISBN 978-0-13-382751-4
(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)
Instructor S20 ISBN 978-0-13-382752-1
(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)
Instructor S20 ISBN 978-0-13-382753-8
(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.

**Elevated Masonry** (15 Hours)
Instructor S20 ISBN 978-0-13-409853-1
(Module ID 28301-14) Describes how to work safely and efficiently on elevated structures. Explains how to maintain a safe work environment, ensure protection from falls, how to brace walls from outside forces, how to identify common types of elevated walls. Stresses safety around equipment such as cranes and hoists.

**Specialized Materials and Techniques** (60 Hours)
Instructor S20 ISBN 978-0-13-409852-4
(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)
(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.

Commercial Drawings (25 Hours)
Instructor $20  ISBN 978-0-13-409850-0
(Module ID 28304-14) Explains how to read and identify drawings for commercial structures using previous experience.

Estimating (25 Hours)
(Module ID 28305-14) Describes how to estimate building materials, such as brick, block, grout, mortar, joint reinforcement, and masonry tyes. 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)
Instructor $20  ISBN 978-0-13-409847-0
(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.

Material Handling, Storage, and Distribution (2.5 Hours)
(Module ID 19104-18) Covers receiving, stacking, and storage of insulation materials, as well as material movement on the jobsite.

Characteristics of Pipe (5 Hours)
Trainee $20  ISBN 978-0-13-448318-4
Instructor $20  ISBN 978-0-13-448316-0
(Module ID 19105-18) 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)
(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)
Instructor $20  ISBN 978-0-13-448322-1
(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)
(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)
(Module ID 19107-18) Explains insulation requirements for fittings, valves, and flanges. Provides tips for professional and economical installation.

Stone Masonry (15 Hours)
(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.

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.

Mechanical Insulating

L1 MECHANICAL INSULATING

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.

Trainee Guide: $67

The following are modules for Mechanical Insulating Levels 1-3, 2nd edition coming in Spring 2018. Ordering information for the first edition is available on www.nccer.org/bookstore.

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

Construction Drawings and Specifications (12.5 Hours)
(Module ID 19309-18) Describes how to determine the insulation requirements of a project by interpreting construction drawings.

Trade Math and Layout (7.5 Hours)
Instructor $20  ISBN 978-0-13-498781-1
(Module ID 19212-18) 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)
(Module ID 19303-18) Describes methods of heat transfer and moisture migration and discusses the application of various types of insulation to slow or prevent these processes.

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

Flexible Foam Insulation (25 Hours)
(Module ID 19201-18) 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)
(Module ID 19302-18) Covers the identification of various duct systems and their associated components.

Blanket Insulation for Ducts (7.5 Hours)
(Module ID 19202-18) Covers fiberglass blanket installation to ducts and apparatus and discusses vapor-sealed blanket insulation facings.

Board Insulation for Ducts (20 Hours)
(Module ID 19303-18) 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.

Cements and Fabric Finishes (10 Hours)
(Module ID 19208-18) Covers the proper use of finishing tools, cleanup and protection procedures, and the limitations of cements, fabric finishes, and mastics.

Insulation Adhesives (5 Hours)
(Module ID 19304-18) Covers the identification, application, and use of adhesives.

Vapor Retarders and Insulation Coatings (10 Hours)
(Module ID 19211-18) 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)
(Module ID 19305-18) 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)
(Module ID 19204-18) 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)
(Module ID 19206-18) 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)
Instructor $20  ISBN 978-0-13-498759-0
(Module ID 19306-18) Describes boilers and related equipment, and their insulation requirements.

Mineral Wool Insulation (12.5 Hours)
(Module ID 19208-18) Describes how to measure, 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)
(Module ID 19313-18) Describes 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)
Instructor $20  ISBN 978-0-13-498748-4
(Module ID 19310-18) 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)
Instructor $20  ISBN 978-0-13-498746-0
(Module ID 19311-18) 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)
(Module ID 19314-18) 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)
(Module ID 19308-18) 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)
(Module ID 46101-17) 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.

The following are modules for Mechanical Insulating Levels 1-3, 2nd edition coming in Spring 2018. Ordering information for the first edition is available on www.nccer.org/bookstore.

L3 MECHANICAL INSULATING
LEVEL 3

Curriculum Notes COMING SOON!
- 152.5 Hours

PAPERBACK ISBN
Instructor’s Guide: $97  978-0-13-483337-8
Instructor’s Guide: $97  978-0-13-498619-7
Millwright

**L1 MILLWRIGHT**

**Level 1**

**Curriculum Notes**
- 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.)
- Revised: 2006, Third Edition
- Downloadable instructor resources that include module tests, PowerPoint®, and performance profile sheets are available at www.nccer.org/irc.

**MODES**

- All of the modules listed below are included in the Trainee Guide and the Instructor’s Guide. The following ISBN and pricing information is for ordering individual modules only.
- **Orientation to the Trade (20 Hours)**
  - Trainee $20
  - Instructor $20
- **Intermediate Trade Math**
  - Trainee $20
  - Instructor $20
- **Fasteners and Anchors**
  - Trainee $20
  - Instructor $20
- **Rigging**
  - Trainee $20
  - Instructor $20
- **Advanced Trade Math**
  - Trainee $20
  - Instructor $20
- **Millwright Power Tools**
  - Trainee $20
  - Instructor $20

**PAPERBACK**

- Trainee Guide: $67
- Instructor’s Guide: $67

**ISBN**

- 978-0-13-227290-2

**MODULES**

- **Orientation to the Trade**
  - Trainee $20
  - Instructor $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**
  - Trainee $20
  - Instructor $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**
  - Trainee $20
  - Instructor $20
  - (Module ID 15103-06) Identifies fasteners and anchors used by millwrights, including their applications and installation procedures.
- **Basic Layout**
  - Trainee $20
  - Instructor $20
  - (Module ID 15104-06) Discusses the tools used in layout. Explains how to lay out baselines using the arch method and 3-4-5 method.
- **Gaskets and O-Rings**
  - Trainee $20
  - Instructor $20
  - (Module ID 15105-06) Describes gaskets and O-rings and their applications. Provides instructions for laying out, cutting, and installing gaskets.
- **Oxyfuel Cutting**
  - Trainee $20
  - Instructor $20
  - (Module ID 15106-06) Explains the safety requirements for oxyfuel cutting. Identifies oxyfuel cutting equipment and provides instructions for setting up, lighting, and using the equipment. Describes how to perform straight line cutting, piercing, beveling, washing, and gouging.

**L2 MILLWRIGHT**

**Level 2**

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

**PAPERBACK**

- Trainee Guide: $97
- Instructor’s Guide: $97

**ISBN**

- 978-0-13-228589-6

**MODES**

- All of the modules listed below are included in the Trainee Guide and the Instructor’s Guide. The following ISBN and pricing information is for ordering individual modules only.
- **Intermediate Trade Math**
  - Trainee $20
  - Instructor $20
  - (Module ID 15201-07) Explains how to use tables of equivalents and conversion tables, figure ratios and proportions, perform right angle trigonometry, calculate take-outs using trigonometry, and calculate volumes and weights of objects.
- **Field Sketching**
  - Trainee $20
  - Instructor $20
  - (Module ID 15202-07) Teaches the basic skills needed to make a good field sketch to convey information about how parts should be made or assembled.
- **Intermediate Blueprint Reading**
  - Trainee $20
  - Instructor $20
  - (Module ID 15203-07) Explains orthogonal projection, isometric, and schematic drawings used to show piping, hydraulic, and pneumatic systems.
- **Specialty Tools**
  - Trainee $20
  - Instructor $20
  - (Module ID 15204-07) Explains how to select, inspect, use and maintain torque multipliers, cable cutters, nut splitters, keyseat blocks, trammels, and pyrometers.
- **Millwright Power Tools**
  - Trainee $20
  - Instructor $20
  - (Module ID 15205-07) Introduces power tools used by millwrights and procedures for using, caring for, and maintaining these tools.

**L3 MILLWRIGHT**

**Level 3**

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

**PAPERBACK**

- Trainee Guide: $97
- Instructor’s Guide: $97

**ISBN**

- 978-0-13-614642-1

**MODES**

- All of the modules listed below are included in the Trainee Guide and the Instructor’s Guide. The following ISBN and pricing information is for ordering individual modules only.
- **Advanced Trade Math**
  - Trainee $20
  - Instructor $20
  - (Module ID 15301-08) Explains right triangle trigonometry and its use in the trade. Also covers interpolation, equilateral and isosceles triangles, and the laws of acute triangles.
- **Precision Measuring Tools**
  - Trainee $20
  - Instructor $20
  - (Module ID 15302-08) Explains how to select, inspect, use and care for levels, calipers, micrometers, height gauges and surface plates, dial indicators, protractors, parallels and gauge blocks, trammels, and pyrometers.
- **Installing Packing**
  - Trainee $20
  - Instructor $20
  - (Module ID 15303-08) Explains how to remove and pack and how to install compression packing and lip-type packing.
- **Installing Seals**
  - Trainee $20
  - Instructor $20
  - (Module ID 15304-08) Covers the applications, removal, and installation procedures for dynamic and static seals, and lip, cup, oil, and labyrinth seals.
- **Installing Mechanical Seals**
  - Trainee $20
  - Instructor $20
  - (Module ID 15305-08) Covers the function and advantages of mechanical seals, identifies parts and types of seals, and includes procedures for removing, inspecting, and installing mechanical seals.

To Order Call: 1-800-922-0579  Stay Connected: www.nccer.org/instructors
Millwright Level 3 (continued)

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

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

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

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

Predalignment for Equipment Installation (15 Hours)
Instructor $20 ISBN 978-0-13-604778-0
(Module ID 15310-08) Explains how to level equipment using jack bolts, wedges, and shims. Covers precision leveling procedures and performing clearance installation. Also describes basic steps for setting motors and pumps.

Installing Belt and Chain Drives (10 Hours)
Instructor $20 ISBN 978-0-13-604784-1
(Module ID 15311-08) Covers the sizes, uses, and installation procedures of six types of drive belts and two types of chain drives.

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

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)
Instructor $20 ISBN 978-0-13-610481-0
(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)
Instructor $20 ISBN 978-0-13-610483-4
(Module ID 15405-08) Describes inspecting, troubleshoot, 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)
Instructor $20 ISBN 978-0-13-610484-1
(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.

L5 MILLWRIGHT

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

PAPERBACK ISBN 978-0-13-609960-4
Trainee Guide: $97
Instructor’s Guide: $97
978-0-13-609961-1

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

Reverse Alignment (30 Hours)
(Module ID 15501-09) 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 measurement.

Advanced Blueprint Reading (25 Hours)
Instructor $20 ISBN 978-0-13-610467-4
(Module ID 15502-09) Using one example system, describes the principles of using laser alignment systems to perform alignments.

Optical Alignment (25 Hours)
Instructor $20 ISBN 978-0-13-610468-1
(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.

L4 MILLWRIGHT

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

Trainee Guide: $97
Instructor’s Guide: $97
978-0-13-604507-6

MODULES
All of the modules listed below are included in the Trainee Guide and the Instructor’s Guide. The following ISBN and pricing information is for ordering individual modules only.
Millwright Level 5 (continued)

**Turbines (20 Hours)**
- Trainee $20
- Instructor $20
  - (Module ID 15505-09) Describes types of turbines and their components. Discusses the operation and common applications of particular types, including gas, steam, and water turbines.

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

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

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

**Painting**

**Curriculum Notes**
- L1: PAINTING - COMMERCIAL & RESIDENTIAL
  - LEVEL 1
  - 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**
- Trainee Guide: $67
  - 978-0-13-771239-7
- Instructor’s Guide: $67
  - 978-0-13-771288-5

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

**Careers in the Painting Trade (5 Hours)**
- Trainee $20
- Instructor $20
  - (Module ID 07201) Provides an overview of construction site productivity, appearance, personal hygiene, and dependability.

**Introduction to Paints and Coatings (10 Hours)**
- Trainee $20
- Instructor $20
  - (Module ID 07202) Explains the nature of substrates, causes of failures, and their remedies. Focuses on the nature of the substrates, application procedures, and surface preparation.

**Identifying Surface/Substrate Materials and Conditions (5 Hours)**
- Trainee $20
- Instructor $20
  - (Module ID 07203) Describes surface preparation of wood, metal, 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)**
- Trainee $20
- Instructor $20
  - (Module ID 07204) 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.

**Sealants and Repair/Fillers (5 Hours)**
- Trainee $20
- Instructor $20
  - (Module ID 07205) Describes the tools, materials, and methods used for protecting adjacent surfaces and areas prior to surface preparation, paint spraying, etc.

**Brushing and Rolling Paints and Coatings (15 Hours)**
- Trainee $20
- Instructor $20
  - (Module ID 07206) 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.

**Painting Failures and Remedies (5 Hours)**
- Trainee $20
- Instructor $20
  - (Module ID 07207) 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.

**Curriculum Notes**
- L2: PAINTING - COMMERCIAL & RESIDENTIAL
  - 145 Hours
  - Revised: 1997

**PAPERBACK ISBN**
- Trainee Guide: $97
  - 978-0-13-771296-0
- Instructor’s Guide: $97
  - 978-0-13-771304-2

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

**Painting Failures and Remedies (5 Hours)**
- Trainee $20
- Instructor $20
  - (Module ID 07208) 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
- Instructor $20
  - (Module ID 07209) 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. Discusses field machine balancing.

**To Order Call: 1-800-922-0579**
**Stay Connected: www.nccer.org/instructors**
Chemical Cleaning and Stripping (7.5 Hours)
Instructor S20  ISBN 978-0-13-874652-0
(Module ID 07203) Describes chemical cleaners and strippers and how they are used to clean and/or remove unwanted material from substrates.

Low-Pressure Water Cleaning (7.5 Hours)
(Module ID 07204) Covers the design and function of low-pressure washing equipment, including procedures for the safe operation and maintenance of typical equipment.

Abrasive Blasting (7.5 Hours)
Instructor S20  ISBN 978-0-13-874793-0
(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)
Trainee S20  ISBN 978-0-13-874778-0
Instructor S20  ISBN 978-0-13-874781-0
(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)
Instructor S20  ISBN 978-0-13-874595-0
(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)
Instructor S20  ISBN 978-0-13-874694-0
(Module ID 07208) Introduces the composition, uses, and application of clear finishes, including varnishes, lacquers, shellacs, and urethanes.

Wood Finishing (22.5 Hours)
Instructor S20  ISBN 978-0-13-874777-0
(Module ID 07209) Presents the science and technology of wood and wood products. Provides procedures and techniques for wood surface preparation and the application of clear finishes to various kinds of wood.

Coatings Two (10 Hours)
Instructor S20  ISBN 978-0-13-874611-7
(Module ID 07210) Introduces the unique properties of high-performance coatings. Includes safety and health considerations, surface preparation, application, testing, and inspection.

Spray Painting (Conventional, Airless and HVLP) (22.5 Hours)
Instructor S20  ISBN 978-0-13-874678-0
(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.

Low-Pressure Water Cleaning (7.5 Hours)
(Module ID 07204) Covers the design and function of low-pressure washing equipment, including procedures for the safe operation and maintenance of typical equipment.

Abrasive Blasting (7.5 Hours)
Instructor S20  ISBN 978-0-13-874793-0
(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)
Trainee S20  ISBN 978-0-13-874778-0
Instructor S20  ISBN 978-0-13-874781-0
(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)
Instructor S20  ISBN 978-0-13-874595-0
(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)
Instructor S20  ISBN 978-0-13-874694-0
(Module ID 07208) Introduces the composition, uses, and application of clear finishes, including varnishes, lacquers, shellacs, and urethanes.

Wood Finishing (22.5 Hours)
Instructor S20  ISBN 978-0-13-874777-0
(Module ID 07209) Presents the science and technology of wood and wood products. Provides procedures and techniques for wood surface preparation and the application of clear finishes to various kinds of wood.

Coatings Two (10 Hours)
Instructor S20  ISBN 978-0-13-874611-7
(Module ID 07210) Introduces the unique properties of high-performance coatings. Includes safety and health considerations, surface preparation, application, testing, and inspection.

Spray Painting (Conventional, Airless and HVLP) (22.5 Hours)
Instructor S20  ISBN 978-0-13-874678-0
(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 Level 2 (continued)

L3 PAINTING - COMMERCIAL & RESIDENTIAL

MODULES

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

Painting Failures and Remedies Two (7.5 Hours)
Instructor S20  ISBN 978-0-13-874918-7
(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.

Job Supervision, Planning, and Control (15 Hours)
(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 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

Spraying with Special Devices (20 Hours)
Instructor S20  ISBN 978-0-13-874892-0
(Module ID 07303) Covers the design and function of textured, 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. 34.
L1 PIPEFITTING

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: 2006, Third Edition
• Downloadable instructor resources that include module tests, PowerPoint®, and performance profile sheets are available at www.nccer.org/arc.
• A Spanish translation is available. Please see NCCER’s online catalog for more information.

PAPERBACK ISBN
Trainee Guide: $67 978-0-13-227310-7
Instructor’s Guide: $67 978-0-13-227312-1

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

Orientation to the Trade (5 Hours)
Trainee $20
Instructor $20
(Module ID 08101-06) Provides an overview of work performed by the pipefitter, as well as the responsibilities, career opportunities, and safety principles associated with the pipefitting trade.

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

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

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

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

PCP-113-8015-01 08100-06 08101-06 08102-06 08103-06 08104-06 08105-06 08106-06

L2 PIPEFITTING

Curriculum Notes

• 162.5 Hours
• Revised: 2006, Third Edition
• Downloadable instructor resources that include module tests, PowerPoint®, and performance profile sheets are available at www.nccer.org/arc.

PAPERBACK ISBN
Instructor’s Guide: $97 978-0-13-227317-6

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

Piping Systems (5 Hours)
Trainee $20
Instructor $20
(Module ID 08201-06) Introduces chemical, compressed air, fuel oil, steam, and water systems. Explains how to identify piping systems according to color codes.

Drawings and Detail Sheets (15 Hours)
Trainee $20
Instructor $20
(Module ID 08202-06) Introduces plot plans, structural drawings, elevation drawings, as-built drawings, equipment arrangement drawings, P&IDs, isometric drawings, spool sheets, and detail sheets.

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

Pipefitting Trade Math (15 Hours)
Trainee $20
Instructor $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
Instructor $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
Instructor $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
Instructor $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
Instructor $20
(Module ID 08208-06) Explains the use of sharing materials per OSHA standards. Covers covering 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
Instructor $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.

L3 PIPEFITTING

Curriculum Notes

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

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

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

MOTORIZED EQUIPMENT
Trainee $20
Instructor $20
(Module ID 08210-06) Explains the use of motorized equipment, including electrical and pneumatic tools, including pipe threading stands, pipe vise, levels, pipe fabrication tools, pipe bending tools, and pipe joining tools.

LADDERS AND SCAFFOLDS
Trainee $20
Instructor $20
(Module ID 08105-06) Describes hazards and safety procedures governing the use of stepladders, extension ladders, fixed scaffolds, and rolling scaffolds. Includes general procedures for scaffold assembly and use.

OXYFUEL CUTTING
Trainee $20
Instructor $20
(Module ID 08104-06) Explains how to perform straight line cutting, piercing, beveling, washing, and gouging.

EQUIPMENT IDENTIFICATION/INSTALLATION
Trainee $20
Instructor $20
(Module ID 08106-06) Explains the safety factors, operator maintenance, and operating procedures associated with motorized equipment used on job sites, including electrical generators, air compressors, aerial lifts, pumps, fork lifts, and hydraulic cranes.

PYTHAGOREAN THEOREM
Trainee $20
Instructor $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.

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Pipefitting Level 3 (continued)

Rigging Equipment (10 Hours)
Instructor $20  ISBN 978-0-13-614636-0

(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 tuggers, jacks, hoists, and come-alongs.

Rigging Practices (10 Hours)
Instructor $20  ISBN 978-0-13-614638-4

(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)

(Module ID 08303-07) Explains how to read and interpret pipelining standards, codes, and specifications. Describes how to identify pipe and components according to specifications.

Advanced Trade Math (20 Hours)

(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)

(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)

(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)

(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)

(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)
Instructor $20  ISBN 978-0-13-614681-0

(Module ID 08309-07) Explains how to perform pretests, service flow tests, head pressure tests, hydrostatic tests, and steam blow tests.

L4 PIPEFITTING

LEVEL 4

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

Instructor’s Guide: $97
Trainee Guide: $97

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

Advanced Blueprint Reading (50 Hours)

(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)

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

Stress Relieving and Aligning (10 Hours)

(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)
Instructor $20  ISBN 978-0-13-604765-0

(Module ID 08404-07) Describes types of steam traps, how they function, and the basic methods for troubleshooting them.

In-Line Specialties (10 Hours)

(Module ID 08405-07) Describes 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)
Instructor $20  ISBN 978-0-13-604767-4

(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.

Hot Taps (10 Hours)
Instructor $20  ISBN 978-0-13-604768-1

(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.

Introduction to Supervisory Roles (7.5 Hours)

(Module ID 08409-07) Offers basic information for pipefitters who have a desire to move into supervisory roles. Provides information on issues related to cultural differences, gender-based social behaviors, and legal and ethical situations that a supervisor is likely to encounter.
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.

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

**Job Site Safety (17.5 Hours)**
Trainee $20  
Instructor $20  
(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)**
Trainee $20  
Instructor $20  
Module ID 24102) Discusses 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 drilling and tapping machines.

**Rigging and Delivering Pipe and Associated Structures (7.5 Hours)**
Trainee $20  
Instructor $20  
(Module ID 24103) Discusses methods for receipt inspection, storage, and delivery to the trench of PVC, ductile iron, corrugated steel, and concrete pipe. Identifies the hand signals used by pipelayers when rigging pipe, and piping components, including manholes and appurtenances.

**Cutting Pipe (12.5 Hours)**
Trainee $20  
Instructor $20  
(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)**
Trainee $20  
Instructor $20  
(Module ID 24105) Describes 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)**
Trainee $20  
Instructor $20  
(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.

**Trench Safety (7.5 Hours)**
Trainee $20  
Instructor $20  
(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)**
Trainee $20  
Instructor $20  
(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)**
Trainee $20  
Instructor $20  
(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.

**Introduction to Plumbing Math (20 Hours)**
Trainee $20  
Instructor $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 Drawings (17.5 Hours)**
Trainee $20  
Instructor $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. Explains 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.

**Introduction to Plumbing Math (12.5 Hours)**
Trainee $20  
Instructor $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.

**Introduction to Plumbing Drawings (17.5 Hours)**
Trainee $20  
Instructor $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. Explains 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)
(Module ID 02108-12) Introduces hub-and-spiget 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.

Copper Tube and Fittings (12.5 Hours)
(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.

Cast-Iron Pipe and Fittings (12.5 Hours)
(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.

Introduction to Plumbing Fixtures (7.5 Hours)
(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)
(Module ID 02111-12) Explains how DWV systems remove waste safely and effectively. Discusses how system components, such as pipe, drains, traps, and vents work. Reviews drain and vent sizing, grade, and waste treatment. Discusses how building sewers and sewer drains connect the DWV system to the public sewer system.

Introduction to Water Distribution Systems (10 Hours)
Instructor $20  ISBN 978-0-13-292346-0
(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.
Compressed Air (10 Hours)
Trainee $20
Instructor $20
(Module ID 02309-14) Explains the principles of compressed air systems and describes their components and accessories. Reviews installation and periodic servicing of air compressor systems.

Service Plumbing (27.5 Hours)
Trainee $20
Instructor $20
(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.

Service Plumbing and Heating (7.5 Hours)
Trainee $20
Instructor $20
(Module ID 02313-14) 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.

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

Service Plumbing (27.5 Hours)
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# Reinforcing Ironwork

## L1 Reinforcing Ironwork

### MODULES

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<th>Course</th>
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<tbody>
<tr>
<td>Concrete Reinforcement</td>
<td>ISBN 978-0-13-228988-7</td>
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<tr>
<td>Concrete Reinforcement Safety</td>
<td>ISBN 978-0-13-228989-4</td>
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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, PowerPoint®️, 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.

### Trainee’s Guide


### Instructor’s Guide


## L2 Reinforcing Ironwork

### MODULES

<table>
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<th>Course</th>
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<tr>
<td>Reinforcing Ironwork Level Two</td>
<td>ISBN 978-0-13-227295-7</td>
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</table>

### Curriculum Notes

- 118.5 Hours
- Published: 2005
- Downloadable instructor resources that include module tests, PowerPoint®️, and performance profile sheets are available at www.nccer.org/irc.

### Trainee’s Guide


### Instructor’s Guide

**SCAFFOLDING**

**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: 2015, Second Edition
- 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**
- Trainee Guide: $67 978-0-13-383081-1

**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
- Instructor $20

**Trade Safety (7.5 Hours)**
- Trainee $20
- Instructor $20

**Trade Tools and Equipment (7.5 Hours)**
- Trainee $20
- Instructor $20

**Trade Math (7.5 Hours)**
- Trainee $20
- Instructor $20

**Supported Scaffolds (32.5 Hours)**
- Trainee $20
- Instructor $20
- ISBN 978-0-13-38899-0

**Mobile Scaffolds (10 Hours)**
- Trainee $20
- Instructor $20

**Suspension Scaffolds (7.5 Hours)**
- Trainee $20
- Instructor $20

**Introduction to Sheet Metal Trade (5 Hours)**
- Trainee $20
- Instructor $20

**Tools of the Trade (5 Hours)**
- Trainee $20
- Instructor $20

**Introduction to Sheet Metal Layout and Processes (7.5 Hours)**
- Trainee $20
- Instructor $20

**Trade Math One (20 Hours)**
- Trainee $20
- Instructor $20
- ISBN 978-0-13-604835-0

**LEVEL 1**

**SHEET METAL**

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

**PAPERBACK**

**ISBN**
- Trainee Guide: $67 978-0-13-604882-6

**MODULES**

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

**Introduction to Sheet Metal Trade (5 Hours)**
- Trainee $20
- Instructor $20

**Introduction to Sheet Metal Layout and Processes (7.5 Hours)**
- Trainee $20
- Instructor $20

**Tools of the Trade (5 Hours)**
- Trainee $20
- Instructor $20

**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.

**Supported Scaffolds (32.5 Hours)**
- Trainee $20
- Instructor $20
- ISBN 978-0-13-38899-0

**Mobile Scaffolds (10 Hours)**
- Trainee $20
- Instructor $20

**Suspension Scaffolds (7.5 Hours)**
- Trainee $20
- Instructor $20

**Introduction to Sheet Metal Trade (5 Hours)**
- Trainee $20
- Instructor $20

**Introduction to Sheet Metal Layout and Processes (7.5 Hours)**
- Trainee $20
- Instructor $20

**Tools of the Trade (5 Hours)**
- Trainee $20
- Instructor $20

**Trade Math One (20 Hours)**
- Trainee $20
- Instructor $20
- ISBN 978-0-13-604835-0
Sheet Metal Level 1 (continued)

Fabrication One – Parallel Line Development
(22.5 Hours)
Trainee $20
Instructor $20
(Module ID 04105-08) Covers the steps involved in using the parallel line development method to lay out fittings. Includes step-by-step procedures for selected fittings.

Installation of Ductwork
(15 Hours)
Trainee $20
Instructor $20
(Module ID 04106-08) Addresses ductwork assembly, use of different types of sealants, using lifts, and installation of ductwork. Describes the types of fasteners (screws, nuts, bolts, and rivets), and supports used in an air distribution system. Discusses proper spacing of hangers, load ratings, and installation of hangers and support systems.

Installation of Air Distribution Accessories
(5 Hours)
Trainee $20
Instructor $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.

Insulation
(7.5 Hours)
Trainee $20
Instructor $20
(Module ID 04206-08) Describes how to install fiberglass blanket, foam, and pipe insulation using approved adhesives and fastening techniques. Also includes the fabrication and installation of fitting covers and preformed fitting covers.

Architectural Sheet Metal
(15 Hours)
Trainee $20
Instructor $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.

L2 SHEET METAL

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

PAPERBACK ISBN

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

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

Soldering
(15 Hours)
Trainee $20
Instructor $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
Instructor $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.

Trade Math Two
(20 Hours)
Trainee $20
Instructor $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, vennier calipers, and micrometers and in solving field measuring problems.

Plans and Specifications
(20 Hours)
Trainee $20
Instructor $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.

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

L3 SHEET METAL

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

PAPERBACK ISBN

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

Trade Math Three – Field Measuring and Fitting
(15 Hours)
Trainee $20
Instructor $20
(Module ID 04301-09) 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.

Principles of Airflow
(22.5 Hours)
Trainee $20
Instructor $20
(Module ID 04303-09) Explains the basic principles of airflow and reviews how airflow is affected by duct size, shape, and fittings. Also reviews the components of an air distribution system.

Louvers, Dampers, and Access Doors
(20 Hours)
Trainee $20
Instructor $20
(Module ID 04304-09) Describes the techniques used for field measuring and layout of ducts and fittings. Also provides practice in solving field measuring problems.

Comprehensive Plan and Specification Reading
(30 Hours)
Trainee $20
Instructor $20
(Module ID 04305-09) Provides a case-study approach to learning how to use building plans and specifications to lay out, fabricate, and install HVAC systems. Allows trainees to proceed through the module as if they were working on an actual building project. Includes construction drawings.
Sheet Metal Level 3 (continued)

**Fabrication Three – Triangulation** (47.5 Hours)
- **Trainee $20**
- **Instructor $20**
- (Module ID 04306-09) Describes the principles of triangulation and how it can be used to measure duct run fittings. Provides a variety of tasks to practice developing, laying out, and fabricating selected duct run fittings.

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

**MODULES**

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

**Shop Production and Organization** (15 Hours)
- **Trainee $20**
- **Instructor $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.

**Air Testing and Balancing** (25 Hours)
- **Trainee $20**
- **Instructor $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**
- **Instructor $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 braise.

**Fume and Exhaust System Design** (25 Hours)
- **Trainee $20**
- **Instructor $20**
- (Module ID 04404-09) Reviews the codes and specifications pertaining to fume and exhaust system design for safe workspaces. 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**
- **Instructor $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.

**Introductory Supervisory Skills** (20 Hours)
- **Trainee $20**
- **Instructor $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.

**Survey Equipment Use and Care** (30 Hours)
- **Trainee $20**
- **Instructor $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**
- **Instructor $20**
- (Module ID 78104-09) 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.

**Surveying Math** (30 Hours)
- **Trainee $20**
- **Instructor $20**
- (Module ID 78102-04) Expands on the Core Curriculum module, Introduction to Construction Math, with emphasis on the metric system, including how to convert between English and metric system units. Covers basic concepts for working with formulas and equations, as well as basic geometry and right-angle trigonometry.

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**Site Layout**

**MODULES**

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

**Introduction to Survey Layout** (10 Hours)
- **Trainee $20**
- **Instructor $20**
- (Module ID 78101-04) Provides an overview of the site layout trade and related tasks. Covers the use of the builder’s level and leveling rods, as well as the equipment and procedures for making distance measurements by taping ( chaining). Also covers the elements of professional conduct, safety, and communications. Briefly describes the aspects of an apprenticeship program and the career path and professional opportunities related to the site layout trade.

**Surveying Math** (30 Hours)
- **Trainee $20**
- **Instructor $20**
- (Module ID 78102-04) Expands on the Core Curriculum module, Introduction to Construction Math, with emphasis on the metric system, including how to convert between English and metric system units. Covers basic concepts for working with formulas and equations, as well as basic geometry and right-angle trigonometry.
Sprinkler Fitting

Introduction to Components and Systems (7.5 Hours)
(Module ID 18102-13) Introduces testing laboratories and listing agencies. Provides an overview of the major types of sprinkler systems including wet pipe, dry pipe, preaction, and deluge systems. Defines sprinkler-head types, orifice size, and K-Factor. Underground and aboveground pipe and tubes are discussed, including hangers, bracing, and restraints. Also covers valves, alarms, and fire department connections.

Steel Pipe (22.5 Hours)
(Module ID 18103-13) Identifies steel piping materials along with tools used to cut and thread steel pipe. Describes methods for threading, cutting, and grooving pipe, including how to determine pipe length between fittings (takeouts). Discusses threaded, plain-end, and flanged fittings.

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

Copper Tube Systems (10 Hours)
(Module ID 18105-13) Introduces copper tubing and fittings along with cutting and bending tools. Discusses the soldering process and techniques for measuring, cutting, reaming, and cleaning. Brazing is described as are brazing metals, fluxes, and brazing equipment. Support bracing for copper tube and grooved couplings for copper pipe are also discussed.

Underground Pipe (17.5 Hours)
(Module ID 18106-13) Details underground piping installations for various types of pipe. Explains thrust block 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.

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

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

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

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

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

Means and Methods (40 Hours)
(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, buildings, columns, walls, embankments, and stairs.
Sprinkler Fitting Level 2 (continued)

**MODULES**

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

**Hangers, Supports, Restraints, and Guides**

*(15 Hours)*

**Trainee $20**


**(Module ID 18201-13)** Identifies strengths/typing requirements, types, and installation of pipe hangers, supports, restraints, and guides. Covers types and installation of earthquake bracing and explains sleeving and fire-stopping.

**General Purpose Valves**

*(15 Hours)*

**Trainee $20**


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

**General Trade Math**

*(20 Hours)*

**Trainee $20**


**(Module ID 18203-13)** Reviews math principles used to solve everyday problems, including unit conversion from the English system to the metric system and vice versa. Includes sprinkler fitting problems such as calculating 45-degree offsets and tank volume, centering sprinkler heads using geometric methods, and problems relating to hanger sizing.

**Shop Drawings**

*(32.5 Hours)*

**Trainee $20**


**(Module ID 18204-13)** Explains how to read drawings to identify materials, calculate square footage and number of sprinklers required, lay out sprinkler hanger locations, and identify sprinkler orifice sizes.

**Standard Spray Fire Sprinklers**

*(20 Hours)*

**Trainee $20**


**(Module ID 18205-13)** Discusses standard spray sprinklers relative to occupancies and to maximum coverage calculations. Explains how to identify sprinkler manufacturer and type using the Sprinkler Identification Number (SIN).

**Wet Fire Sprinkler Systems**

*(25 Hours)*

**Trainee $20**


**(Module ID 18206-13)** 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.

**Sprinkler Fitting Level 2 (continued)**

**L3 SPRINKLER FITTING**

**LEVEL 3**

**Curriculum Notes**

- 147.5 Hours
- revised: 2013, Third Edition to reflect NFPA 13
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

**PAPERBACK**

Trainee Guide: $90


Instructor’s Guide: $90


**MODULES**

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

**Deluge/Preaction Systems**

*(40 Hours)*

**Trainee $20**


**(Module ID 18301-13)** Describes deluge and preaction systems and explains installation techniques and troubleshooting.

**Standpipes**

*(25 Hours)*

**Trainee $20**


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

**Water Supplies**

*(15 Hours)*

**Trainee $20**

ISBN 978-0-13-378873-0

**(Module ID 18303-13)** Covers basic water chemistry and properties. Discusses methods of determining water supply requirements and considerations for supply systems. Discusses infrastructure, measurement of water supply capability, water supply appurtenances, fire department connections, and typical city water pits.

**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.

**L4 SPRINKLER FITTING**

**LEVEL 4**

**Curriculum Notes**

- 145 Hours
- revised: 2013, Third Edition to reflect NFPA 13
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

**PAPERBACK**

Trainee Guide: $90


Instructor’s Guide: $90


**MODULES**

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

**System Layout**

*(45 Hours)*

**Trainee $20**


**(Module ID 18401-13)** Identifies basic hydraulic concepts and selection of hydraulic design methods. System configuration, design criteria, discharge characteristics, and types of pressure loss are explained. Explains how to perform fire sprinkler system hydraulic calculations.

**Inspection, Testing, and Maintenance**

*(17.5 Hours)*

**Trainee $20**


**(Module ID 18402-13)** Describes initial and periodic testing and inspection requirements, as well as maintenance and repair of wet-pipe systems, dry-pipe systems, preaction/deluge systems, and special systems.

**Special Extinguishing Systems**

*(42.5 Hours)*

**Trainee $20**


**(Module ID 18403-13)** Identifies the following extinguishing exposure systems: water spray, foam, carbon dioxide, Halon, auxiliary and local alarm. Limited water systems, fire extinguishers, and water mist suppression systems are also covered.

**Introductory Skills for the Foreman**

*(20 Hours)*

**Trainee $20**


**(Module ID 18404-13)** Introduces the role of foremanship and covers responsibilities, leadership, and safety. Also explains project documentation and reports related to materials tracking and labor tracking.

**Procedures and Documentation**

*(20 Hours)*

**Trainee $20**


**(Module ID 18405-13)** Explains the importance of proper documentation to ensure correct installation and avoid future rework and possible unintentional releases. Emphasizes the need to properly document the actual installation using written reports and photographs. Includes causes of and responses to water damage, and provides a case history of an unintentional release.
ALIGNS WITH AWS SENSE STANDARDS AND GUIDELINES

NCCER is pleased to support the American Welding Society’s Schools Excelling through National Skills Education (SENSE) Entry Welder program with Levels 1 and 2 of its Welding curriculum. This curriculum supports the key learning indicators and performance accreditation tasks required to complete the current SENSE program.

L1 WELDING

Curriculum Notes

- 357.5 Hours (Includes 72.5 hours of Core Curriculum, which is a prerequisite for Level 1 completion and must be purchased separately. See p. 14 for ordering information.)
- Revised: 2015, Fifth Edition
- Sequenced in accordance with the American Welding Society’s (AWS) S.E.N.S.E school requirements. When combined with NCCER Welding Level 2, the content aligns with the key indicators specified in AWS 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/arc.

Hardcover ISBN

Trainee Guide: $69 978-0-13-413110-8

Paperback ISBN


NCCERconnect + Paperback Trainee Guide: $92 978-0-13-457833-0

Modules

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

Welding Safety (5 Hours)

Trainee $20 978-0-13-416580-6

Instructor $20 978-0-13-414189-3

(Module ID 29101-15) Covers safety equipment, protective clothing, and procedures applicable to the cutting and welding of metals.

Oxyfuel Cutting (17.5 Hours)

Trainee $20 978-0-13-418268-1

Instructor $20 978-0-13-414193-9

(Module ID 29102-15) Explains the safety requirements for oxyfuel cutting, identifies oxyfuel cutting equipment and setup requirements. Explains how to light, adjust, and shut down oxyfuel equipment. Trainees will perform cutting techniques that include straight line, piercing, bevels, welding, and gouging.

Plasma Arc Cutting (7.5 Hours)

Trainee $20 978-0-13-418269-8

Instructor $20 978-0-13-414190-9

(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.

Air-Carbon Arc Cutting and Gouging (10 Hours)

Trainee $20 978-0-13-418270-4

Instructor $20 978-0-13-414195-4

(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 welding and gouging activities.

Base Metal Preparation (12.5 Hours)

Trainee $20 978-0-13-414043-8

Instructor $20 978-0-13-414191-6

(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 $20 978-0-13-414044-5

Instructor $20 978-0-13-414196-1

(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 – Groove Welds with Backing (50 Hours)

Trainee $20 978-0-13-418022-9

Instructor $20 978-0-13-414206-7

(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 ISBN

Trainee Guide: $99 978-0-13-431110-4

Paperback ISBN

Trainee Guide: $97 978-0-13-416310-9

NCCERconnect Access Card: $97 978-0-13-452907-3


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 $20 978-0-13-417950-6

Instructor $20 978-0-13-414273-8

(Module ID 29201-15) Identifies and explains the different types of fillet weld, groove weld, and non-destructive examination symbols. Explains how to read welding symbols on drawings, specifications, and Welding Procedure Specifications (WPS).
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Reading Welding Detail Drawings (10 Hours)
(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)
(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 fluoroscopy methods used to identify metals.

Preheating and Postheating of Metals (5 Hours)
(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)
(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)
(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 multipass fillet and V-groove welds on carbon steel plate in various positions.

FCAW – Plate (60 Hours)
(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 multipass fillet and V-groove welds on carbon steel plate in various positions.

GTAW – Equipment and Filler Metals (10 Hours)
(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)
(Module ID 29208-15) Describes how to build pads on carbon steel plate using GTAW and carbon steel filler metal. Also explains how to make multiple-pass GTAW fillet welds on carbon steel plate coupons in the 1F, 2F, 3F, and 4F positions, and how to make GTAW V-groove welds in the 1G, 2G, 3G, and 4G positions.

GTAW – Low Alloy and Stainless Steel Pipe (80 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 – Carbon Steel Pipe (80 Hours)
Instructor $20 ISBN 978-0-13-448569-0
(Module ID 29305-16) Explains how to set up GTAW equipment for open-root V-groove welds on low-alloy and stainless steel pipe, and explains how to prepare for and make open-root V-groove welds on low-alloy and stainless steel pipe. Provides procedures for making open-root V-groove welds with GTAW equipment on low-alloy and stainless steel pipe in the 2G, 5G, and 6G positions.

SMAW – Stainless Steel Plate and Pipe Groove Welds (100 Hours)
Instructor $20 ISBN 978-0-13-448572-0
(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.

SMAW – Open-Root Pipe Welds (100 Hours)
Instructor $20 ISBN 978-0-13-448561-4
(Module ID 29301-16) Explains how to set up SMAW equipment for open-root V-groove welds, and explains how to prepare for and make open-root V-groove welds on carbon steel pipe. Provides procedures for making open-root V-groove welds with SMAW equipment on pipe in the 1G-ROTATED, 2G, 5G, and 6G positions.

SMAW – Stainless Steel Plate and Pipe Groove Welds (100 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.

LEVEL 3 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 ISBN
Trainee Guide: $97 978-0-13-448245-3
NCCERconnect Access Card: $97 978-0-13-452913-4
NCCERconnect + Trainee Guide: $122 978-0-13-471945-0

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 – Open-Root Pipe Welds (100 Hours)
Instructor $20 ISBN 978-0-13-448561-4
(Module ID 29301-16) Explains how to set up SMAW equipment for open-root V-groove welds, and explains how to prepare for and make open-root V-groove welds on carbon steel pipe. Provides procedures for making open-root V-groove welds with SMAW equipment on pipe in the 1G-ROTATED, 2G, 5G, and 6G positions.

GMAW – 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.

FCAW – Pipe (60 Hours)
(Module ID 29303-16) Explains how to set up FCAW 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 FCAW equipment on pipe in the 1G-ROTATED, 2G, 5G, and 6G positions.

LEVEL 4 CURRICULUM NOTES

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

PAPERBACK ISBN
Instructor’s Guide: $97 978-0-13-457591-9
NCCERconnect Access Card: $97 978-0-13-452915-8

MODULES
All of the modules listed below are included in the Trainee Guide and the Instructor’s Guide. The following ISBN and pricing information is for ordering individual modules only.
### Welding Level 4 (continued)

**GMAW – Aluminum Plate (30 Hours)**
- **Trainee**: $20
- **Instructor**: $20

**GMAW – Aluminum Pipe (50 Hours)**
- **Trainee**: $20
- **Instructor**: $20

**GTAW – Aluminum Plate (30 Hours)**
- **Trainee**: $20
- **Instructor**: $20

**GTAW – Aluminum Pipe (50 Hours)**
- **Trainee**: $20
- **Instructor**: $20

### Mobile Crane Operations

#### L1 MOBILE CRANE OPERATIONS

**Basic Principles of Cranes** (15 Hours)
- **Trainee**: $20
- **Instructor**: $20

**Rigging Practices** (15 Hours)
- **Trainee**: $20
- **Instructor**: $20

**Crane Communications** (10 Hours)
- **Trainee**: $20
- **Instructor**: $20
- **Trainee**: $20
- **Instructor**: $20

**Operating a Crane** (25 Hours)
- **Trainee**: $20
- **Instructor**: $20
- ISBN 978-0-13-498736-1 (Module ID 21051-18) Discusses 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.

### Soldering and Brazing (12.5 Hours)

- **Trainee**: $20
- **Instructor**: $20
- ISBN 978-0-13-467757-6 (Module ID 29405-16) Introduces the equipment, techniques, and materials used to solder and brazing processes. Covers the required PPE, preparation, and work processes in detail. Also presents procedure for brazing to dissimilar materials such as steel.

### Mobile Crane Operations

#### L2 MOBILE CRANE OPERATIONS

**Curriculum Notes**
- **145 Hours**
- 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
- **Instructor**: $20
- ISBN 978-0-13-498799-6 (Module ID 21202-18) 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)
Instructor $20  ISBN 978-0-13-498793-4
(Module ID 21204-18) 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)
Instructor $20  ISBN 978-0-13-498791-0
(Module ID 21203-18) Covers the types of inspections typically performed on mobile cranes. Describes service requirements for crane maintenance.

Load Dynamics (17.5 Hours)
Instructor $20  ISBN 978-0-13-498790-4
(Module ID 21206-18) Covers leverage, forward and backward stability, operational quadrants, submerged lifts, non-centered lifts, and other forces that affect stability.

Transporting Requirements (17.5 Hours)
Instructor $20  ISBN 978-0-13-498788-0
(Module ID 21308-18) 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)
Instructor $20  ISBN 978-0-13-498786-6
(Module ID 21207-18) 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.

LIFT PLANNING

Curriculum Notes COMING SOON!

• 145 Hours
• Revised: 2018, Third Edition
• Downloadable instructor resources that include module tests, PowerPoint®, and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK ISBN

The following are modules for Mobile Crane Operator, 3rd Edition coming in Spring 2018.
Ordering information for the second edition is available at www.nccer.org/bookstore.

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)
(Module ID 21301-18) 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.

Rigger/Signal Person

Basic Rigger

Curriculum Notes

• 127.5 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: 2018, Third Edition
• Downloadable instructor resources that include module tests, PowerPoint®, and performance profile sheets are available at www.nccer.org/irc.
• A Spanish translation of Rigger Fundamentals is available. Please see NCCER’s online catalog for more information.

PAPERBACK ISBN
Trainee Guide: $49  978-0-13-518508-7
Instructor’s Guide: $49  978-0-13-489806-3

The following are modules for Basic Rigger, 3rd Edition coming in Spring 2018. Ordering information for the second edition is available on www.nccer.org/bookstore.

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

Rigging Practices (15 Hours)
(Module ID 38102-18) 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)
Instructor $20  ISBN 978-0-13-498818-4
(Module ID 21106-18; from Mobile Crane Operations Level One)
Basic Rigger (continued)

**Basic Principles of Cranes** (15 Hours)
(Module ID 21102-18; from Mobile Crane Operations Level One)
Trainee $20
Instructor $20
ISBN 978-0-13-498810-0

**Crane Communications** (10 Hours)
Trainee $20
Instructor $20
(Module ID 53101-18) 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.

**Telescopic Boom Attachment Setup and Assembly** (20 Hours)
(Module ID 21302-18; from Mobile Crane Operations Level Three)
Trainee $20
Instructor $20

**Lattice Boom Assembly and Disassembly** (25 Hours)
(Module ID 21306-18; from Mobile Crane Operations Level Three)
Trainee $20
Instructor $20


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

**Intermediate Rigging** (17.5 Hours)
Trainee $20
Instructor $20
(Module ID 38201-18) Describes basic procedures for using various slings in hitches and calculating sling stress. Introduces tools and equipment used for the lateral movement of loads without a crane. Trainees learn how to reeve block and tackle, invert loads with hoists, and drift a load between two hoists.

**Load Dynamics** (17.5 Hours)
(Module ID 21206-18; from Mobile Crane Operations Level Two)
Trainee $20
Instructor $20
ISBN 978-0-13-498791-0

**Wire Rope** (25 Hours)
(Module ID 21204-18; from Mobile Crane Operations Level Two)
Trainee $20
Instructor $20

The following are modules for Advanced Rigger, 3rd Edition coming in Spring 2018. Ordering information for the second edition is available on www.nccer.org/irc.

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

**Advanced Rigging** (20 Hours)
Trainee $20
Instructor $20
(Module ID 38301-18) 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** (25 Hours)
(Module ID 21301-18; from Mobile Crane Operations Level Three)
Trainee $20
Instructor $20

**Lift Planning** (20 Hours)
(Module ID 21304-18; from Mobile Crane Operations Level Three)
Trainee $20
Instructor $20

**Hoisting Personnel** (20 Hours)
(Module ID 21305-18; from Mobile Crane Operations Level Three)
Trainee $20
Instructor $20

To Order Call: 1-800-922-0579

www.nccer.org/instructors
Tower Crane Operator

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)
Instructor $20 ISBN 978-0-13-213829-1
(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)
Instructor $20 ISBN 978-0-13-213831-4
(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)
Instructor $20 ISBN 978-0-13-213832-1
(Module ID 48105-10) Explains how to use load charts to calculate safe lifting capacities for self-erecting, lifting boom, and hammerhead tower cranes. Also covers parts of line and counterweight configurations.

Communications (10 Hours)
(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)
(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, lifting 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.

Alternative Energy

Introduction to Alternative Energy (25 Hours)
(Module ID 74101-11) Identifies the need for alternative energy development. Describes the contributions and potential of individual alternative energy sources. Also covers the present U.S. electrical grid and issues affecting specific alternative energy source tie-in and reliability.

Biomass and Biofuels (22.5 Hours)
(Module ID 74102-11) Defines potential sources of biomass and biofuels and discusses their advantages and disadvantages for energy production. Discusses the future of biomass as well as biomass energy applications.

Nuclear Power (25 Hours)
Instructor $20 ISBN 978-0-13-272942-0
(Module ID 74103-11) Discusses 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 solar PV applications.

Wind Power (22.5 Hours)
Instructor $20 ISBN 978-0-13-272944-4
(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.
Solar Photovoltaics

**SOLAR PHOTOVOLTAIC SYSTEMS INSTALLER**

**LEVEL 1**

**Curriculum Notes**

- 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 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.

**MODULES**

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

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

- Trainee $22
- Instructor $22

- (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 $20
- Instructor $20

- (Module ID 57102-11) Explains how to determine customer needs, assess site-specific safety hazards, conduct a site survey, and identify a suitable location for the PV array and other system components. Also explains how to acquire and interpret site solar radiation and temperature data.

**System Installation and Inspection** (60 Hours)

- Trainee $20
- Instructor $20

- (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 $20
- Instructor $20

- (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
- Instructor’s Guide: $53


**This module has been endorsed and approved by GBCI for 20 general and LEED-specific continuing education hours for credential maintenance.**

A related assessment certification exam, developed by NCCER and endorsed by GBCI, is available. For more information, contact NCCER Customer Service at 1-888-622-3720.

This craft requires additional instructor qualifications. For more information, contact NCCER Customer Service at 1-888-622-3720 or visit the craft page at nccer.org.

**Your Role in the Green Environment**

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

**PAPERBACK**

- Trainee Guide: $30
- Instructor’s Guide: $30


**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.

Weatherization

Introduction to Weatherization

17.5 Hours
Published: 2010
Module ID 59101-10

PAPERBACK ISBN
Trainee Guide: $22
Instructor’s Guide: $22
978-0-13-216699-7
978-0-13-216700-0

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.

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: $149
Instructor’s Guide: $149
978-0-13-267252-8
978-0-13-267251-1

Food and Masonry Construction Methods

(12.5 Hours)
(Module ID 33102-10; from Electronic Systems Technician Level One)
Trainee $20
Instructor $20

Thermal & Moisture Protection

(7.5 Hours)
(Module ID 27203-07; from Carpentry Level Two, Fourth Edition)
Trainee $20
Instructor $20

Concrete and Steel Construction Methods

(12.5 Hours)
(Module ID 33103-10; from Electronic Systems Technician Level One)
Trainee $20
Instructor $20
ISBN 978-0-13-266284-0
Wind Energy

**L1 WIND TURBINE MAINTENANCE TECHNICIAN**

**LEVEL 1**

**Curriculum Notes**
- Volume 1: 197.5 Hours (Includes 100 hours of Power Industry Fundamentals, which is a prerequisite for Level 1 completion and must be purchased separately. See p. 89 for ordering information.)
- Volume 2: 110 Hours
- Published: 2011

**MODULES**
- Downloadable instructor resources that include module tests, PowerPoint®️, and performance profile sheets are available at www.nccer.org/irc.
- Introduction to Wind Energy (Module ID 58101-11) has been approved for 15 general continuing education hours under GBCI’s Credential Maintenance Program.

**PAPERBACK**

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**VI VOLUME 1**

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

**Introduction to Wind Energy** (15 Hours)
- Trainee S22
- Instructor S22

**Introduction to Wind Energy** (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.
Wind Energy (continued)

### Introduction to Wind Turbine Safety (12.5 Hours)
- **Trainee $20**
- **Instructor $20**
- (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)
- **Trainee $20**
- **Instructor $20**
- (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)
- **Trainee $20**
- **Instructor $20**
- (Module ID 26103-11; from Electrical Level One, Seventh Edition)

### Electrical Theory (7.5 Hours)
- **Trainee $20**
- **Instructor $20**
- (Module ID 26104-11; from Electrical Level One, Seventh Edition)

### Electrical Test Equipment (5 Hours)
- **Trainee $20**
- **Instructor $20**
- (Module ID 26112-11; from Electrical Level One, Seventh Edition)

### Electrical Wiring (10 Hours)
- **Trainee $20**
- **Instructor $20**
- (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 listed below are included in the Trainee Guide and Instructor’s Guide. The following ISBN and pricing information is for ordering individual modules only.

#### Alternating Current and Three-Phase Systems (17.5 Hours)
- **Trainee $20**
- **Instructor $20**

#### Circuit Breakers and Fuses (10 Hours)
- **Trainee $20**
- **Instructor $20**
- (Module ID 58105-11) Explains the necessity of overcurrent protection and the way it is applied in the wind turbine environment. Explores the operation of common circuit breakers and the differences in various fuse types. Overcurrent device terminology is presented, along with a review of the information found on such devices.

#### Switching Devices (12.5 Hours)
- **Trainee $20**
- **Instructor $20**
- (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)
- **Trainee $20**
- **Instructor $20**
- (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)
- **Trainee $20**
- **Instructor $20**
- (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 tabs and dies is also introduced.

#### Introduction to Bearings (15 Hours)
- **Trainee $20**
- **Instructor $20**
- (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)
- **Trainee $20**
- **Instructor $20**

#### Lubrication (12.5 Hours)
- **Trainee $20**
- **Instructor $20**
- (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.

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**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 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  
- **Instructor’s Guide:** $65  

**Modules**
- **Air Quality Equipment (5 Hours):** 03204-07
- **Indoor Air Quality (12.5 Hours):** 03403-09
- **Energy Conservation Equipment (10 Hours):** 03404-09
- **Alternative Heating and Cooling Systems (10 Hours):** 03409-09
Management Learning Series

The Management Learning Series provides companies with the tools to develop qualified management personnel. From Fundamentals of Crew Leadership to Project Supervision to Project Management, these programs provide an answer to the management shortage crisis impacting companies today and expected to continue for the foreseeable future.

Fundamentals of Crew Leadership

22.5 Hours
Revised: 2017, Third Edition
Module ID 46101-17

PAPERBACK ISBN
NCCERConnect Access Card: $43 978-0-13-487592-7

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

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.

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

Project Supervision

Curriculum Notes
• 85 Hours
• Published: 2001

PAPERBACK ISBN
Participant Guide: $95 978-0-13-103595-9
Instructor’s Guide: $110 978-0-13-103596-6
(includes one test access code and transparency masters)

MODULES
All of the modules listed below are included in the Participant Guide and the Instructor’s Guide. The following ISBN and pricing information is for ordering individual modules only.

Orientation to the Job (5 Hours)
(Module ID MT201-01) Introduces the history of the construction industry and construction organization. Covers the phases of a construction project and the role and duties of the supervisor.

Human Relations and Problem Solving (20 Hours)
(Module ID MT202-01) Focuses on the communication process and developing effective communication and leadership skills. Compares problem solving to decision making. Discusses potential human relations difficulties and how to resolve them.

Safety (7.5 Hours)
(Module ID MT203-01) Describes the supervisor’s role in job-site safety, the true cost of accidents, and how to train and involve all employees in job safety. Includes OSHA safety inspections.

Quality Control (5 Hours)
(Module ID MT204-01) Defines different types of quality control. Explains how to incorporate quality and safety through effective communication, document control, and inspections.

Contract and Construction Documents (5 Hours)
(Module ID MT205-01) Teaches how to understand and interpret construction drawings, technical specifications, and as-built drawings. Includes different types of bidding, contracts, change orders, closeout documents, and more.

Document Control and Estimating (10 Hours)
(Module ID MT206-01) Provides an introduction to using and maintaining document control. Defines the elements of material, labor, and equipment estimates and how to develop, organize, and look for errors in an estimate.

Planning and Scheduling (17.5 Hours)
(Module ID MT207-01) Introduces stages of planning, how to implement a plan, and how to coordinate with other contractors. Includes planning resources, materials, equipment, tools, and labor. Discusses short- and long-term schedules.

Resource Control and Cost Awareness (15 Hours)
(Module ID MT208-01) Explains how to measure job-site productivity and how to increase it. Discusses resources, materials, tools, equipment, labor, quality, and cost and resource control. Introduces cost awareness and types of reports.

Sustainable Construction Supervisor

Sustainable Construction Supervisor has been developed to instruct construction managers on sustainable construction management, the LEED rating system as it would apply to oversight of their projects and crews, and how to supervise and train their subcontractors and crews so that LEED points aren’t unintentionally sacrificed. This module is published in full color and is competency-based. An assessment is also available. For more information, see p. 68.
Project Management

Interpersonal Skills (12.5 Hours)
  (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)
  (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)
- Instructor $20 ISBN 978-0-13-603861-0
  (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.

Scheduling (15 Hours)
  (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)
- Instructor $20 ISBN 978-0-13-603863-4
  (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.

Continuous Improvement (5 Hours)
  (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.

Resource Control (10 Hours)
  (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

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.
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.

**Maritime Industry Fundamentals**

**Introduction to the Maritime Industry**

12.5 Hours  
Published: 2013  
Module ID 84101-13

**PAPERBACK**  
ISBN

- Trainee Guide: $22  
- Instructor’s Guide: $22

- 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**

**Orientation to the Maritime Pipefitting Trade**  
(5 hours)  
Trainee S20  
Instructor S20  

- (Module ID 85101-13) Provides an overview of the maritime pipefitting trade and its career opportunities. Trade safety principles are introduced, as well as the responsibilities and characteristics of a good pipefitter.

**Maritime Pipefitting Trade Math**  
(15 hours)  
Trainee S20  
Instructor S20  

- (Module ID 85102-13) Explains how to solve a wide variety of maritime pipefitting math problems, including those related to common geometrical figures. The process of determining lengths in pipe offsets for general and rolling offsets is also presented.

**Pipefitting Hand Tools**  
(20 hours)  
Trainee S20  
Instructor 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  
Instructor S20  

- (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  
Instructor 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, beveling, washing, and gouging are reviewed. Oxyfuel gas supply arrangements from both cylinders and manifolds are also presented.

**Ladders and Scaffolds**  
(12.5 hours)  
Trainee S20  
Instructor 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.
### Maritime Pipefitting Level 2

#### Curriculum Notes
- **147.5 Hours**
- **Published: 2013**
- Downloadable instructor resources that include module tests, PowerPoint®️️️️️️️️️️, and performance profile sheets are available at www.nccer.org/irc.

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

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####Butt Weld Pipe Fabrication (37.5 hours)
- **Instructor S20**: ISBN 978-0-13-340614-6
  - (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 S20**: ISBN 978-0-13-340599-6
- **Instructor S20**: ISBN 978-0-13-340615-3
  - (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.

####Threaded Pipe Fabrication (15 hours)
- **Trainee S20**: ISBN 978-0-13-340601-6
- **Instructor S20**: ISBN 978-0-13-340617-7
  - (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.

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### Maritime Structural Fitter

#### Curriculum Notes
- **240 hours** (Includes 100 hours of Maritime Industry Fundamentals, which is a prerequisite for Level 1 completion and must be purchased separately. See p. 74 for ordering information.)
- **Published: 2014**
- Downloadable instructor resources that include module tests, PowerPoint®, and performance profile sheets are available at www.nccer.org/irc.

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

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<td>978-0-13-294864-7</td>
<td>978-0-13-294927-9</td>
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####Welding Safety (2.5 Hours)
- **Instructor S20**: ISBN 978-0-13-610506-0
  - (Module ID 29105-09; from Welding Level One, Fourth Edition) Prepares a worker to perform fire watch duties in support of welding and flame cutting activities. Describes the classes of fires and the methods used to extinguish them, as well as the responsibilities of a person assigned as a fire watch.

####Tack Welding (40 Hours)
- **Instructor S20**: ISBN 978-0-13-377950-9
  - (Module ID 86101-14) Describes how to set up welding equipment, strike an arc, and make tack welds in order to maintain proper alignment of parts in anticipation of finish welding. Covers the machines, tools, and techniques used to make tack welds in various positions.

####Introduction to Structural Fitter Drawings (10 Hours)
- **Instructor S20**: ISBN 978-0-13-377951-6
  - (Module ID 86102-14) Prepares a worker to perform fire watch duties in support of welding and flame cutting activities. Describes the classes of fires and the methods used to extinguish them, as well as the responsibilities of a person assigned as a fire watch.

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To Order Call: 1-800-922-0579
Stay Connected: www.nccer.org/instructors
Fitting One (40 Hours)
(Module ID 86104-14) Introduces layout tools, fitting tools, and fitting aids used to fit up and align plate joints. Incorporates hands-on tasks through which the beginning fitter will learn how to perform basic layout, alignment, and fit-up tasks.

Intermediate Structural Print Reading (40 Hours)
(Module ID 86202-14) Covers interpretation of fabrication and installation drawings, sketching of isometric and orthographic drawings, and interpretation of welding symbols.

Cutting and Burning Processes (40 Hours)
(Module ID 86201-14) Expands on flame cutting methods covered in Level 1, including laying out and cutting bevels, chamfers, and circles. Also covers the methods used to cut or split common structural components such as beams and bars.

Plasma Arc Cutting (7.5 Hours)
(Module ID 29103-09; from Welding Level One, Fourth Edition) Covers selection and application of gaskets and packings, fit-up tasks, and inspection of finished work. Also covers structural accessories, proper measuring techniques, and creating a materials list.

Advanced Structural Print Reading (40 Hours)
(Module ID 86301-15) Focuses on learning to interpret ship construction drawings, ranging from the highest level general arrangement drawings to the lowest level piece-part drawing. Includes a set of drawings.

Fitting Two (140 Hours)
Trainee $20  ISBN 978-0-13-378729-0
(Module ID 86203-14) Explains selection and application of gaskets and packings, fit-up tasks, and inspection of finished work. Also covers structural accessories, proper measuring techniques, and creating a materials list.

Fitting Three (80 Hours)
Instructor $20  ISBN 978-0-13-414490-0
(Module ID 86302-15) Provides an overview of the ship construction process, from the lowest subassembly to the erection of the vessel itself. Illustrates laying out the locations of equipment and structural members, installing the equipment and structural members, and the use of leveling and alignment equipment.

GMAW and FCAW – Equipment and Filler Metals (10 Hours)
(Module ID 29205-09; from Welding Level Two, Fourth Edition)

GMAW and FCAW – Plate (80 Hours)
Instructor $20  ISBN 978-0-13-214157-4
(Module ID 29206-09; from Welding Level Two, Fourth Edition)

Physical Characteristics and Mechanical Properties of Metals (7.5 Hours)
Trainee $43  ISBN 978-0-13-414493-1
Instructor $43  ISBN 978-0-13-414492-4
(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.

Fundamentals of Crew Leadership (20 Hours)
Instructor $43  ISBN 978-0-13-414492-4
(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.
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.

Covered Task level Reference Table

Each covered task level is linked to its purchase page through VitalSource. You must create an account and be logged in to purchase each level. Click here for more information.

<table>
<thead>
<tr>
<th>Covered Task Number</th>
<th>Covered Task Title - Qualification Description</th>
<th>Craft Title</th>
<th>Level Exam Specifications</th>
<th>Performance Profiles</th>
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<td>Pipeline Corrosion Control 3e Level 2</td>
<td>Performance Profiles</td>
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</table>
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](http://www.nccer.org/pipeline)
Pipeline Corrosion Control

Level 2: Craft-Specific Training with Operator Qualification

Pipeline Maintenance

Level 3: Craft-Specific Training with Operator Qualification

Pipeline Electrical and Instrumentation

Trained and Qualified Pipeline Professional Credential

Pipeline Operations (Control Center/Gas/Liquid)

Pipeline Mechanical

Pipeline Operations Technician

Pipeline Mechanical Technician

Pipeline Maintenance Technician

Pipeline Electrical and Instrumentation Technician

Pipeline Corrosion Technician
Introduction to the Pipeline Industry

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<td>S20</td>
<td>978-0-13-472783-8</td>
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<td>(Module ID 64106-02) Explains basic principles of hydraulic systems,</td>
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<td>ASME ratings and standards. Discusses station control systems and</td>
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<td>recognizing and responding to AOCs. Also covers pigging operations</td>
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<td>and proving process meters.</td>
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<td>(Module ID 62103-02) Describes company environmental regulations and</td>
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<td>and ASME ratings and standards. Discusses station control systems and</td>
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<td>S20</td>
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<td>industry including maps, P&amp;IDs, and electrical drawings. Also describes</td>
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Abnormal Operating Conditions

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Abnormal Operating Conditions Control Center

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Pipeline Electrical and Instrumentation

**L1 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.

**MODULES**
All of the modules listed below are included in the Trainee and Instructor Guide(s) listed above. The following pricing information is for ordering individual modules which can be purchased through the online bookstore at www.nccer.org/bookstore.

### VOLUME 1

**Pipeline & I&E Safety** (15 Hours)
- Trainee $20
- Instructor $20
- Module ID 64102-02: Describes the types and uses of personal protective equipment and covers hazard communications. Covers lockout/tagout and MSDS requirements; safety rules, regulations, and tools; and worksite hazards.

**Trade Math** (40 Hours)
- Trainee $20
- Instructor $20
- 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)
- Trainee $20
- Instructor $20
- Module ID 64104-02: Introduces the electrical concepts used in Ohm’s law as applied to DC series circuits. Discusses atomic theory, electromagnetic force, resistance, and electric power equations. Also introduces series, parallel, and series-parallel circuits. Covers resistive circuits, Kirchhoff’s voltage and current laws, and circuit analysis.

**Tools of the Trade** (15 Hours)
- Trainee $20
- Instructor $20
- Module ID 64105-02: Identifies hand tools used in the pipeline & I&E trade. Also explains trade-specific power tools, test equipment, and communication equipment.

**VOLUME 2**

**Process Control Theory** (40 Hours)
- Trainee $20
- Instructor $20
- 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.

**Electrical Installations in Classified Areas** (40 Hours)
- Trainee $20
- Instructor $20
- 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.

**Grounding** (30 Hours)
- Trainee $20
- Instructor $20
- Module ID 64203-02: Explains grounding basics, system types, NEC® requirements, equipment grounding, and how to bond service equipment. Includes discussion of effective grounding paths, conductors, separately derived systems, grounding at more than one building, and systems over 1,000 volts. Describes how to test grounding and measure earth resistance, three-point testing, and tank grounding.

**Use of Meters and Test Equipment** (15 Hours)
- Trainee $20
- Instructor $20
- Module ID 64202-02: Explains general, personal, and test equipment for E&I safety. Covers measuring current, voltage, and resistance of types of meters used. Includes specialty instruments such as calibrators, simulators, and gauges. Includes sections on oscilloscope operation, waveform characteristics, and measurement techniques.

**Fasteners and Anchors** (7.5 Hours)
- Trainee $20
- Instructor $20
- 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.

**Power Quality and Types of Control Applications** (25 Hours)
- Trainee $20
- Instructor $20
- Module ID 64301-02: Describes power systems and explains 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)
- Trainee $20
- Instructor $20
- Module ID 64300-02: Explains pipeline 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)
- Trainee $20
- Instructor $20
- Module ID 64302-02: Explains pipeline supervisory control and data acquisition systems, including control, communications, SCADA, and PLCs. Explains redundant systems and control system troubleshooting.

**Supervisory Control Systems** (15 Hours)
- Trainee $20
- Instructor $20
- Module ID 64205-02: Explains pipeline supervisory control systems, PLCs, HMIs, and RTUs. Describes data highways and protocols, including data transfer methods, and SCADA-related communications, including transfer media, wireless radios, and Ethernet, and transmission and interface methods.

**Transformers and MCCs** (25 Hours)
- Trainee $20
- Instructor $20
- Module ID 64301-02: Describes power systems and explains transformer construction, taps, installation requirements, and connections. Describes power distribution, instruments, control, and isolation transformer types. Also covers transformer maintenance and testing.

**Pipeline Electrical and Instrumentation**

Pipeline E&I Drawings (30 Hours)
- Trainee $20
- Instructor $20
- (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)
- Trainee $20
- Instructor $20
- (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)
- Trainee $20
- Instructor $20
- (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)
- Trainee $20
- Instructor $20
- (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.

Use of Meters and Test Equipment (15 Hours)
- Trainee $20
- Instructor $20
- (Module ID 64202-02): Explains general, personal, and test equipment for E&I safety. Covers measuring current, voltage, and resistance of types of meters used. Includes specialty instruments such as calibrators, simulators, and gauges. Includes sections on oscilloscope operation, waveform characteristics, and measurement techniques.

Grounding (30 Hours)
- Trainee $20
- Instructor $20
- (Module ID 64203-02): Explains grounding basics, system types, NEC® requirements, equipment grounding, and how to bond service equipment. Includes discussion of effective grounding paths, conductors, separately derived systems, grounding at more than one building, and systems over 1,000 volts. Describes how to test grounding and measure earth resistance, three-point testing, and tank grounding.

**To Order Call: 1-800-922-0579**

**Stay Connected:**

www.nccer.org/instructors
Pipeline Maintenance and Mechanical

VOLUME 2
Trainee Guide: $100 978-0-13-480569-6
Instructor’s Guide: $100 978-0-13-479533-5

MODULES
All of the modules listed below are included in the Trainee and Instructor Guide(s) listed above. The following pricing information is for ordering individual modules which can be purchased through the online bookstore at www.nccer.org/bookstore.

1. Piping and Mechanical Blueprint Reading (15 Hours)
   Trainee $20 978-0-13-038337-2
   Instructor $20 978-0-13-038334-0
   (Module ID 63104-02) Explains how to read plot plans, P&IDs, piping isometric drawings, detail sheets, and machine drawings. Describes common components and symbols used in various drawings.

2. Tubing, Threaded Pipe, and Hoses (30 Hours)
   Trainee $20 978-0-13-038338-9
   Instructor $20 978-0-13-038345-7
   (Module ID 63105-02) Introduces a variety of tubing, tubing materials, tools, and work practices used in the pipeline industry. Identifies the materials used in threaded piping systems. Describes the types and uses of screwed fittings.

3. Fasteners (10 Hours)
   Trainee $20 978-0-13-038339-6
   Instructor $20 978-0-13-038346-4
   (Module ID 63106-02) Covers installation procedures for threaded, non-threaded, and insulation fasteners used in the pipeline industry.
Pipeline Maintenance and Mechanical Level 1, Volume 1 (continued)

Identify Types of Valve Actuators/Operators (15 Hours)
Trainee $20  Instructor $20
(Module ID 63108-02) Identifies types of manual, electric, hydraulic, and pneumatic valve actuators used in the pipeline industry. Covers storage and handing, installation, and preventive maintenance procedures for these actuators.

Installing Seals and Gaskets (10 Hours)
Trainee $20  Instructor $20
(Module ID 63109-02) Covers the applications, removal procedures, and installation procedures for dynamic and static seals and O-rings. Also identifies gaskets and gasket materials and explains the procedures for laying out, cutting, and installing gaskets.

Introduction to Pneumatic Systems (10 Hours)
Trainee $20  Instructor $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  Instructor $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  Instructor $20
(Module ID 63203-02) Introduces specialty tools and precision measuring tools and explains how to select, inspect, use, and care for these tools.

Introduction to Metering Devices and Provers (10 Hours)
Trainee $20  Instructor $20
(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  Instructor $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  Instructor $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  Instructor $20
(Module ID 62301-02) Explains preventive and predictive maintenance and general maintenance on rotating machinery. Discusses gas compressors and maintaining pumps and prime movers.

V2 VOLUME 2

Tank Repair (40 Hours)
Trainee $20  Instructor $20
(Module ID 62307-02) Explains complete tank repair, including flange 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 nozzle, manways, and sumps.

Install and Maintain Bearings (15 Hours)
Trainee $20  Instructor $20
(Module ID 63209-02) Identifies friction and antifriction bearings, bearing materials, and bearing designation. Gives procedures to remove, troubleshoot, and install bearings.

Install Mechanical Seals (20 Hours)
Trainee $20  Instructor $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  Instructor $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  Instructor $20
(Module ID 63301-02) Identifies inspection requirements for an equipment pad, requirements for equipment base preparation, and procedures for inspecting equipment prior to installation. Also explains how to prepare equipment prior to installation, the installation process for rotating equipment, and the procedures used to relieve pipe stress from rotating equipment.

Unit Alignment (40 Hours)
Trainee $20  Instructor $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  Instructor $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  Instructor $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  Instructor $20
(Module ID 63305-02) Identifies the typical lubrication system components, preventive maintenance requirements, and common troubleshooting techniques for a gas compressor. Also gives general guidelines for preparing a gas compressor for shutdown and repair, isolating a gas compressor from a pipeline system, repairing rotary and reciprocating gas compressors, and preparing a gas compressor for startup and operational check after maintenance has been completed.

Maintain, Troubleshoot, and Repair Metering Devices and Provers (20 Hours)
Trainee $20  Instructor $20
(Module ID 63309-02) Explains how to inspect, maintain, and repair metering devices and prover systems. Also describes the drawdown 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/arc.
• 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.
Pipeline Maintenance Level 2 (continued)

Abnormal Operating Conditions - Control Center (5 Hours)
(Module ID AACCGC_17)
Trainee $20
Instructor $20

Abnormal Operating Conditions - Field and Gas (5 Hours)
(Module ID AOCFG_17)
Trainee $20
Instructor $20
ISBN 978-0-13-472784-4

Visually Inspect Surface Conditions of Right-of-Way (5 Hours)
(Module ID CT15_1-17)
Trainee $20
Instructor $20

Inspect Navigable Waterway Crossing (5 Hours)
(Module ID CT16_1-17)
Trainee $20
Instructor $20

Routine Inspection of Breakout Tanks (API 653 Monthly or DOT Annual) (7.5 Hours)
(Module ID CT27_1_17)
Trainee $20
Instructor $20

Provide Security for Pipeline Facilities (2.5 Hours)
(Module ID CT28_0_1-17)
Trainee $20
Instructor $20
ISBN 978-0-13-471763-0

Observation of Excavation Activities (5 Hours)
(Module ID CT32_0-17)
Trainee $20
Instructor $20
ISBN 978-0-13-471764-4

Inspect Existing Pipe Following Movement (5 Hours)
(Module ID CT34_0-17)
Trainee $20
Instructor $20

Install or Repair Support Structures on Existing Aboveground Components (5 Hours)
(Module ID CT37_0-17)
Trainee $20
Instructor $20

Visually Inspect Pipe and Pipe Components Prior to Installation (5 Hours)
(Module ID CT38_1_17)
Trainee $20
Instructor $20

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

Conduct Vegetation Survey (5 Hours)
(Module ID CT52_1-17)
Trainee $20
Instructor $20
ISBN 978-0-13-471776-0

Conduct a Leak Survey with a CGD (5 Hours)
(Module ID CT52_2-147)
Trainee $20
Instructor $20

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

Vault Maintenance (10 Hours)
(Module ID CT59_0-17)
Trainee $20
Instructor $20

Cold Cutting (10 Hours)
(Module ID CTCC_17)
Trainee $20
Instructor $20

Flange Bolting (75 Hours)
(Module ID CTBF_17)
Trainee $20
Instructor $20

Mud Plugging (5 Hours)
(Module ID CTMP_17)
Trainee $20
Instructor $20
ISBN 978-0-13-471789-0

Tubing (7.5 Hours)
(Module ID CT1TB_17)
Trainee $20
Instructor $20

Threaded Pipe Fabrication (15 Hours)
(Module ID CTTP_17)
Trainee $20
Instructor $20

Locate Line (5 Hours)
(Module ID CT14_1-17)
Trainee $20
Instructor $20
ISBN 978-0-13-470687-0

Install, Inspect, and Maintain Permanent Marker (5 Hours)
(Module ID CT14_2-17)
Trainee $20
Instructor $20

Install, Inspect, and Maintain Temporary Marker (7.5 Hours)
(Module ID CT14_5-17)
Trainee $20
Instructor $20
ISBN 978-0-13-470692-4
ISBN 978-0-13-470690-0

Launching In-Line Inspection Devices (2.5 Hours)
(Module ID CT29_1-17)
Trainee $20
Instructor $20
ISBN 978-0-13-470693-1

Receiving In-Line Inspection Devices (5 Hours)
(Module ID CT29_2-17)
Trainee $20
Instructor $20

Determine Allowable Line Pressure in Section of Pipe to be Moved (5 Hours)
(Module ID CT33_1-17)
Trainee $20
Instructor $20

Preparation for Movement Activities (5 Hours)
(Module ID CT33_2-17)
Trainee $20
Instructor $20

Moving In-Service Pipeline (5 Hours)
(Module ID CT33_3-17)
Trainee $20
Instructor $20

Safe Disconnect of Pipeline Facilities (5 Hours)
(Module ID CT36_1-17)
Trainee $20
Instructor $20

Purging of Pipeline Facilities (5 Hours)
(Module ID CT36_2-17)
Trainee $20
Instructor $20

Sealing a Disconnected Portion of Pipeline (5 Hours)
(Module ID CT36_3-17)
Trainee $20
Instructor $20

Visually Inspect that Welds Meet DOT Requirements (API 1104) (5 Hours)
(Module ID CT38_3-17)
Trainee $20
Instructor $20

Fit Full Encirclement Welded Split Sleeve (10 Hours)
(Module ID CT40_1-17)
Trainee $20
Instructor $20

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L3 PIPELINE MAINTENANCE

Curriculum Notes

• 187.5 Hours
• Revised: 2017, Third Edition
• Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.
• Available as print on demand
• To purchase individual covered task modules, please visit www.nccer.org/pipeline-program

PAPERBACK
Trainee Guide: $100

MODULES

All of the modules listed below are included in the Trainee Guide. The following pricing information is for ordering individual modules which can be purchased through the online bookstore at www.nccer.org/bookstore.

Abnormal Operating Conditions - Field and Gas (5 Hours)
(Module ID AOCFG_17)
Trainee $20
Instructor $20
ISBN 978-0-13-472784-4
### Pipeline Maintenance Level 3 (continued)

#### MODULAR TRAINING

<table>
<thead>
<tr>
<th>Module ID</th>
<th>Title</th>
<th>Trainee</th>
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<tr>
<td>CT40_5-17</td>
<td>Install and Remove Completion Plug on Pipeline System (15 Hours)</td>
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<td>CT41_0-17</td>
<td>Conduct Pressure Test (15 Hours)</td>
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<td>CT42_7-17</td>
<td>Welding (15 Hours)</td>
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#### MODULES

**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**

- Control Center (5 Hours) (Module ID CT19_1-17)
  - Trainee: $20
  - Instructor: $20

- Field and Gas (5 Hours) (Module ID CT19_2-17)
  - Trainee: $20
  - Instructor: $20

- Valve Body Winterization or Corrosion Inhibition (5 Hours) (Module ID CT19_3-17)
  - Trainee: $20
  - Instructor: $20
  - ISBN: 978-0-13-470656-0

- Valve Lubrication (5 Hours) (Module ID CT19_4-17)
  - Trainee: $20
  - Instructor: $20

- Valve Seat Sealing (12.5 Hours) (Module ID CT19_5-17)
  - Trainee: $20

- Valve Stem Packing Maintenance (12.5 Hours) (Module ID CT19_6-17)
  - Trainee: $20

- Adjust Actuator/Operator, Electric (7.5 Hours) (Module ID CT19_7-17)
  - Trainee: $20

- Adjust Actuator/Operator, Hydraulic (7.5 Hours) (Module ID CT19_8-17)
  - Trainee: $20

- Inspect Main-Line Valves (7.5 Hours) (Module ID CT20_0-17)
  - Trainee: $20

- Repair Valve Actuator/Operator, Pneumatic (7.5 Hours) (Module ID CT21_1-17)
  - Trainee: $20

- Disassemble and Reassemble Valves (7.5 Hours) (Module ID CT21_2-17)
  - Trainee: $20

- Internal Inspection of Valves and Their Components (7.5 Hours) (Module ID CT21_3-17)
  - Trainee: $20

- Repair Valve Actuator/Operator, Hydraulic (7.5 Hours) (Module ID CT21_4-17)
  - Trainee: $20

- Repair Valve Actuator/Operator, Electric (7.5 Hours) (Module ID CT22_1-17)
  - Trainee: $20

- Inspect Tank Pressure/Vacuum Breakers (5 Hours) (Module ID CT24_0-17)
  - Trainee: $20

**PAPERBACK**

- Trainee Guide: $100

**LEVEL 2**

**Curriculum Notes**

- 67.5 Hours
- Revised: 2017, Third Edition
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.
- Available as print on demand
- To purchase individual covered task modules, please visit www.nccer.org/pipeline-program

**LEVEL 3**

**Curriculum Notes**

- 80 Hours
- Revised: 2017, Third Edition
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.
- Available as print on demand
- To purchase individual covered task modules, please visit www.nccer.org/pipeline-program

**PAPERBACK**

- Trainee Guide: $100

To Order Call: 1-800-922-0579

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Pipeline Field and Control Center Operations

**L1 PIPELINE FIELD AND CONTROL CENTER OPERATIONS**

**LEVEL 1**

**Curriculum Notes**
- 115 Hours
- Revised: 2017, Third Edition
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

**PAPERBACK**
- Trainee Guide: $100
- Instructor’s Guide: $100

**MODULES**
All of the modules listed below are included in the Trainee and Instructor Guide(s) listed above. The following pricing information is for ordering individual modules which can be purchased through the online bookstore at www.nccer.org/bookstore.

**Quality Control and Measurement (20 Hours)**
- Trainee S20
- Instructor S20
  (Module ID 67106-02) Focuses on the importance of accuracy and control measurement as they affect safety, customer service, and the company’s reputation. Topics include taking samples, performing product testing, and product testing and measurement tools.

**Product Batch and Pig Tracking (10 Hours)**
- Trainee S20
- Instructor S20
  (Module ID 60104-02) Describes how to track pipeline product line inventories; handle scheduled pipeline shipments; identify product interface changes; and launch, receive, and track pigs through the pipeline and facility.

**L2 PIPELINE OPERATIONS (CONTROL CENTER/GAS/LIQUID)**

**LEVEL 2**

**Curriculum Notes**
- 110 Hours
- Revised: 2017, Third Edition
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.
- Available as print on demand
- To purchase individual covered task modules, please visit www.nccer.org/pipeline-program

**PAPERBACK**
- Trainee Guide: $100

**MODULES**
All of the modules listed below are included in the Trainee Guide. The following pricing information is for ordering individual modules which can be purchased through the online bookstore at www.nccer.org/bookstore.

**Abnormal Operating Conditions - Control Center** (5 Hours)
- Trainee S20
- Instructor S20
- (Module ID AOCCC-17)

**Abnormal Operating Conditions - Field and Gas** (5 Hours)
- Trainee S20
- Instructor S20
- (Module ID AOCFG-17)

**Purge Gas from a Pipeline** (5 Hours)
- Trainee S20
- Instructor S20
- (Module ID CTG0_0-17)

**Purge Air from a Gas Pipeline** (5 Hours)
- Trainee S20
- Instructor S20
- (Module ID CTG1_0-17)

**Test Remotely Controlled Shutdown Devices** (5 Hours)
- Trainee S20
- Instructor S20
- (Module ID CTG4_0-17)

**Field Quality Control** (15 Hours)
- Trainee S20
- Instructor S20
  (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 S20
  - ISBN 978-0-13-038232-0
- Instructor S20
  (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.

**Liquid Pipeline Measurement and Quality Control** (20 Hours)
- Trainee S20
- Instructor S20
  (Module ID 65107-02) Describes 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)
- Trainee S20
- Instructor S20
  (Module ID 64307-02) 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.

**Inspect, Test, and Calibrate HVL Tank** (5 Hours)
- Trainee S20
- Instructor S20
  (Module ID CT22_1-17)

**Inspect, Test, and Calibrate Relief Valves** (5 Hours)
- Trainee S20
- Instructor S20
  (Module ID CT23_2-17)

**Inspect, Test and Calibrate Pressure Limiting Devices** (5 Hours)
- Trainee S20
- Instructor S20
  (Module ID CT24_1-17)
Pipeline Operations (Control Center/Gas/Liquid) Level 2

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)
Instructor $20 ISBN 978-0-13-472797-4

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 (Field) (5 Hours)
(Module ID CT63_2-17)

Monitor Pressures, Flows, Communications, and Line Integrity and Maintain Them Within Allowable Limits on a Liquid Pipeline System (Field) (5 Hours)
(Module ID CT63_3-17)

Locally Operate Valves on a Liquid Pipeline System (5 Hours)
(Module ID CT63_4-17)
Instructor $20 ISBN 978-0-13-472807-0

Start-up of a Liquid Pipeline (Control Center) (5 Hours)
(Module ID CT64_1-17)

Shutdown of a Liquid Pipeline (Control Center) (5 Hours)
(Module ID CT64_2-17)

Monitor Pressures, Flows, Communications, and Line Integrity and Maintain Them Within Allowable Limits (Gas) (5 Hours)
(Module ID CT65_1-17)

Remotely Operate Valves on a Liquid Pipeline System (5 Hours)
(Module ID CT64_3-17)

Pipeline Corrosion Control

Abnormal Operating Conditions - Control Center (5 Hours)
(Module ID AOC0G6-17)
Instructor $20 ISBN 978-0-13-472785-1

Abnormal Operating Conditions - Field and Gas (5 Hours)
(Module ID AOC0G6-17)
Instructor $20 ISBN 978-0-13-472784-4

Verify Test Lead Continuity (5 Hours)
(Module ID CT2_1-17)
Instructor $20 ISBN 978-0-13-472095-1

Repair Damaged Test Leads (5 Hours)
(Module ID CT2_2-17)
Instructor $20 ISBN 978-0-13-472092-0

Install Test Leads by Non-Exothermic Welding Methods (5 Hours)
(Module ID CT2_3-17)

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)
Instructor $20 ISBN 978-0-13-474465-0

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)
Instructor $20 ISBN 978-0-13-472079-1

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

Pipeline Corrosion Control

L1 PIPELINE CORROSION CONTROL
LEVEL 1

Curriculum Notes
• 105 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
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.
Examine for Mechanical Damage on Buried or Submerged Pipe (5 Hours)
(Module ID CT5_1-17)
Trainee $20
Instructor $20

Examine for External Corrosion on Buried or Submerged Pipe (5 Hours)
(Module ID CT5_2-17)
Trainee $20
Instructor $20

Inspect the Condition of External Coating on Buried or Submerged Pipe (5 Hours)
(Module ID CT5_3-17)
Trainee $20
Instructor $20

Visual Inspection of Atmospheric Coatings (5 Hours)
(Module ID CT7_1-17)
Trainee $20
Instructor $20

Prepare Surface for Atmospheric Coating Using Hand and Power Tools (5 Hours)
(Module ID CT7_2-17)
Trainee $20
Instructor $20

Prepare Surface for Coating by Abrasive Water Blasting (5 Hours)
(Module ID CT7_3-17)
Trainee $20
Instructor $20

Prepare Surface for Coating by Abrasive Blasting Media Other Than Water (5 Hours)
(Module ID CT7_4-17)
Trainee $20
Instructor $20
ISBN 978-0-13-472063-0

Apply Coating Using Hand Application Methods (5 Hours)
(Module ID CT7_5-17)
Trainee $20
Instructor $20

Apply Coating Using Spray Application (5 Hours)
(Module ID CT7_6-17)
Trainee $20
Instructor $20

Perform Coating Inspection (5 Hours)
(Module ID CT7_7-17)
Trainee $20
Instructor $20

Visually Inspect Internal Pipe Surface (5 Hours)
(Module ID CT12_0-17)
Trainee $20
Instructor $20

L2 PIPELINE CORROSION CONTROL LEVEL 2

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
Trainee Guide: $100

MODULES
All of the modules listed below are included in the Trainee Guide. The following pricing information is for ordering individual modules which can be purchased through the online bookstore at www.nccer.org/bookstore.

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

Measure Structure-to-Soil Potentials (5 Hours)
(Module ID CT1_1-17)
Trainee $20
Instructor $20

Conduct Close Interval Survey (5 Hours)
(Module ID CT1_2-17)
Trainee $20
Instructor $20

Test and Detect Interference (5 Hours)
(Module ID CT1_3-17)
Trainee $20
Instructor $20

Inspect and Perform Electrical Test of Bonds (5 Hours)
(Module ID CT1_4-17)
Trainee $20
Instructor $20
ISBN 978-0-13-471028-0

Inspect and Test Electrical Isolation (5 Hours)
(Module ID CT1_5-17)
Trainee $20
Instructor $20

Measure Pit Depth with Pit Gauge (5 Hours)
(Module ID CT8_1-17)
Trainee $20
Instructor $20

Measure Wall Thickness with Ultrasonic Meter (5 Hours)
(Module ID CT8_2-17)
Trainee $20
Instructor $20

Measure Corroded Area (5 Hours)
(Module ID CT8_3-17)
Trainee $20
Instructor $20
ISBN 978-0-13-471044-0

Install Bonds (5 Hours)
(Module ID CT9_1-17)
Trainee $20
Instructor $20

Install Galvanic Anodes (5 Hours)
(Module ID CT9_2-17)
Trainee $20
Instructor $20

Install Rectifiers (5 Hours)
(Module ID CT9_3-17)
Trainee $20
Instructor $20

Install impressed Current Groundbeds (5 Hours)
(Module ID CT9_4-17)
Trainee $20
Instructor $20

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

Install Electrical Insulating Device (5 Hours)
(Module ID CT9_6-17)
Trainee $20
Instructor $20

Insert and Remove Coupons (5 Hours)
(Module ID CT10_1-17)
Trainee $20
Instructor $20
ISBN 978-0-13-471031-0

Monitor Probes (Online) (5 Hours)
(Module ID CT10_2-17)
Trainee $20
Instructor $20

Monitoring and Controlling the Injection Rate of the Corrosion Inhibitor (5 Hours)
(Module ID CT11_0-17)
Trainee $20
Instructor $20
**Power Industry Fundamentals**

12.5 Hours
Published: 2010
Module ID 49101-10

PAPERBACK  ISBN
Trainee Guide: $22  978-0-13-215413-0
Instructor’s Guide: $22  978-0-13-215414-7

• 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
Technical Level One)
Instructor $20  ISBN 978-0-13-614626-1

**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)
Instructor $20  ISBN 978-0-13-614597-4

**Construction Drawings**  (12.5 Hours)
(Module ID 40107-07; from Industrial Maintenance E&I
Technician Level One)
Instructor $20  ISBN 978-0-13-614598-1

**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)
Instructor $20  ISBN 978-0-13-614601-8

**Mobile and Support Equipment**  (10 Hours)
(Module ID 40112-07; 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)

**SMAW Equipment and Setup**  (5 Hours)
(Module ID 29107-09; from Welding Level One, Fourth Edition)

**Lubrication**  (12.5 Hours)
(Module ID 40113-07; from Industrial Maintenance E&I
Technician Level One)

To Order Call: 1-800-922-0579
Stay Connected:  www.nccer.org/instructors
Power Generation Maintenance Electrician Level 2

**Course Name:** Power Generation Maintenance Electrician Level 2

**Course Code:** L2

**Module Details:**
- **Conductor Terminations and Splices:**
  - Duration: 10 Hours
  - Description: Trainees will learn about various conductor terminations and splices.  
  - Trainee: $20
  - Instructor: $20
  - ISBN: 978-0-13-604775-0

- **Motor Controls:**
  - Duration: 15 Hours
  - Description: Trainees will cover motor control systems and practices.  
  - Trainee: $20
  - Instructor: $20

- **Hydraulic Controls:**
  - Duration: 15 Hours
  - Description: Trainees will learn about hydraulic control systems.  
  - Trainee: $20
  - Instructor: $20

- **Pneumatic Controls:**
  - Duration: 15 Hours
  - Description: Trainees will study pneumatic control systems.  
  - Trainee: $20
  - Instructor: $20

- **Programmable Logic Controllers:**
  - Duration: 17.5 Hours
  - Description: Trainees will learn about PLC systems.  
  - Trainee: $20
  - Instructor: $20

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

**PAPERBACK**
- Trainee Guide: $97
- Instructor’s Guide: $97

**ISBN**
- 978-0-13-215423-9
- 978-0-13-215424-6

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**MODELS**

**Industrial Safety for E&I Technicians**
- Duration: 15 Hours
  - (Module ID 40201-08; from Industrial Maintenance E&I Technician Level Two)
  - Trainee: $20
  - Instructor: $20

**Managing Electrical Hazards**
- Duration: 12.5 Hours
  - (Module ID 26501-08; from Electrical, First Edition)
  - Trainee: $20
  - Instructor: $20

**Introduction to the National Electrical Code®**
- Duration: 5 Hours
  - (Module ID 40202-08; from Industrial Maintenance E&I Technician Level Two)
  - Trainee: $20
  - Instructor: $20

**Electrical Theory**
- Duration: 15 Hours
  - (Module ID 40203-08; from Industrial Maintenance E&I Technician Level Two)
  - Trainee: $20
  - Instructor: $20
  - ISBN: 978-0-13-604718-6

**Alternating Current**
- Duration: 20 Hours
  - (Module ID 40204-08; from Industrial Maintenance E&I Technician Level Two)
  - Trainee: $20
  - Instructor: $20

**E&I Drawings**
- Duration: 10 Hours
  - (Module ID 40303-09; from Industrial Maintenance E&I Technician Level Three)
  - Trainee: $20
  - Instructor: $20

**E&I Test Equipment**
- Duration: 10 Hours
  - (Module ID 40205-08; from Industrial Maintenance E&I Technician Level Two)
  - Trainee: $20
  - Instructor: $20

**Conductors and Cables**
- Duration: 10 Hours
  - (Module ID 40212-08; from Industrial Maintenance E&I Technician Level Two)
  - Trainee: $20
  - Instructor: $20

**Motor Selection and Calculations**
- Duration: 15 Hours
  - (Module ID 40307-09; from Industrial Maintenance E&I Technician Level Three)
  - Trainee: $20
  - Instructor: $20

**Transformer Applications**
- Duration: 7.5 Hours
  - (Module ID 40309-08; from Industrial Maintenance E&I Technician Level Three)
  - Trainee: $20
  - Instructor: $20

**Circuit Breakers and Fuses**
- Duration: 12.5 Hours
  - (Module ID 40310-08; from Industrial Maintenance E&I Technician Level Three)
  - Trainee: $20
  - Instructor: $20

**Distribution Equipment**
- Duration: 17.5 Hours
  - (Module ID 40305-08; from Industrial Maintenance E&I Technician Level Three)
  - Trainee: $20
  - Instructor: $20
  - ISBN: 978-0-13-604749-0

**Power Plant Electrical Systems**
- Duration: 12.5 Hours
  - (Module ID 50301-11; from Industrial Maintenance E&I Technician Level Three)
  - Trainee: $20
  - Instructor: $20

**Conductor Selection and Calculations**
- Duration: 15 Hours
  - (Module ID 40307-09; from Industrial Maintenance E&I Technician Level Three)
  - Trainee: $20
  - Instructor: $20

**Motors: Theory and Application**
- Duration: 20 Hours
  - (Module ID 40206-08; from Electrical Level Two, Sixth Edition)
  - Trainee: $20
  - Instructor: $20
  - ISBN: 978-0-13-604763-0

**Grounding and Bonding**
- Duration: 15 Hours
  - (Module ID 40204-08; from Electrical Level Two, Sixth Edition)
  - Trainee: $20
  - Instructor: $20

**Fuses: Theory and Application**
- Duration: 15 Hours
  - (Module ID 40307-09; from Industrial Maintenance E&I Technician Level Three)
  - Trainee: $20
  - Instructor: $20

**Control Systems and Fundamental Concepts**
- Duration: 12.5 Hours
  - (Module ID 40313-08; from Industrial Maintenance E&I Technician Level Three)
  - Trainee: $20
  - Instructor: $20
To Order Call: 1-800-922-0579  www.nccer.org/instructors

Power Generation Maintenance Electrician Level 3 (continued)

Temporary Grounding  (15 Hours)  
(Module ID 40308-09; from Industrial Maintenance E&I Technician Level Three)  
Trainee $20  
Instructor $20  
ISBN 978-0-13-604738-4  

L4  POWER GENERATION MAINTENANCE ELECTRICIAN

Level 4

Curriculum Notes
• 197.5 Hours
• Published: 2011
• downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK  ISBN  
Trainee Guide: $97  
978-0-13-215428-4  
Instructor’s Guide: $97  
978-0-13-215429-1

Modules

Load Calculations — Branch and Feeder Circuits  (17.5 Hours)  
(Module ID 26301-08; from Electrical Level Three, Sixth Edition)  
Trainee $20  
Instructor $20  

Motor Calculations (12.5 Hours)  
(Module ID 26309-08; from Electrical Level Three, Sixth Edition)  
Trainee $20  
Instructor $20  

Overcurrent Protection  (25 Hours)  
(Module ID 26305-08; from Electrical Level Three, Sixth Edition)  
Trainee $20  
Instructor $20  
ISBN 978-0-13-609294-0  

Specialty Transformers (10 Hours)  
(Module ID 26406-08; from Electrical Level Four, Sixth Edition)  
Trainee $20  
Instructor $20  
ISBN 978-0-13-609319-0  

Advanced Controls  (20 Hours)  
(Module ID 26407-08; from Electrical Level Four, Sixth Edition)  
Trainee $20  
Instructor $20  

Motor Operation and Maintenance  (10 Hours)  
(Module ID 26410-08; from Electrical Level Four, Sixth Edition)  
Trainee $20  
Instructor $20  
ISBN 978-0-13-609244-4  

Generator Maintenance  (20 Hours)  
(Module ID 50401-10)  
Trainee $20  
Instructor $20  
ISBN 978-0-13-266213-0

(training for AC and DC generators. Topics include generator connection methods; voltage regulators; auxiliary systems; and maintenance procedures.

Switchgear and Breaker Maintenance (25 Hours)  
(Module ID 50402-11)  
Trainee $20  
Instructor $20  

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

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

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

Power Generation I&C Maintenance Technician

L1  POWER GENERATION I&C MAINTENANCE TECHNICIAN

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 p. 89 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  
Trainee Guide: $67  
978-0-13-215430-7  
Instructor’s Guide: $67  
978-0-13-215431-4

Modules

Tools of the Trade  (5 Hours)  
(Module ID 40102-07; from Industrial Maintenance E&I Technician Level One)  
Trainee $20  
Instructor $20  

Fasteners and Anchors (5 Hours)  
(Module ID 40103-07; from Industrial Maintenance E&I Technician Level One)  
Trainee $20  
Instructor $20  

Oxyfuel Cutting  (17.5 Hours)  
(Module ID 40104-07; from Industrial Maintenance E&I Technician Level One)  
Trainee $20  
Instructor $20  

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

Craft-Related Mathematics  (15 Hours)  
(Module ID 40106-07; from Industrial Maintenance E&I Technician Level One)  
Trainee $20  
Instructor $20  
ISBN 978-0-13-614597-4

Construction Drawings (12.5 Hours)  
(Module ID 40107-07; from Industrial Maintenance E&I Technician Level One)  
Trainee $20  
Instructor $20  
ISBN 978-0-13-614598-1

Pumps and Drivers  (5 Hours)  
(Module ID 40108-07; from Industrial Maintenance E&I Technician Level One)  
Trainee $20  
Instructor $20  
### Power Generation I&C Maintenance Technician Level 1 (continued)

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<td><strong>Introduction to Test Instruments</strong> (7.5 Hours)</td>
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<td>Technician Level One</td>
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<tr>
<td><strong>Material Handling and Hand Rigging</strong> (15 Hours)</td>
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<td>Technician Level One</td>
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<td>Technician Level One</td>
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<td><strong>SMAW Equipment and Setup</strong> (5 Hours)</td>
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### L2 POWER GENERATION I&C MAINTENANCE TECHNICIAN

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<th><strong>Curriculum Notes</strong></th>
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<tr>
<td>• 167.5 Hours</td>
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<td>• Published: 2010</td>
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<tr>
<td>• Downloadable instructor resources that include module tests, PowerPoint®, and performance profile sheets are available at <a href="http://www.nccer.org/irc">www.nccer.org/irc</a>.</td>
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<td>Technician Level Two</td>
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<td>Technician Level Two</td>
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<td>Technician Level Three</td>
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<td>Instructor $20</td>
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<td><strong>Programmable Logic Controllers</strong> (17.5 Hours)</td>
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<tr>
<td>Technician Level Four</td>
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<td>Instructor $20</td>
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### L3 POWER GENERATION I&C MAINTENANCE TECHNICIAN

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

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<td>Technician Level Two</td>
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<tr>
<td><strong>Flow, Pressure, Level and Temperature</strong> (15 Hours)</td>
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<td>Technician Level Two</td>
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<tr>
<td><strong>Instrument Drawings and Documents, Part One</strong> (15 Hours)</td>
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<td>Technician Level Two</td>
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<td><strong>Electrical Systems for Instrumentation</strong> (22.5 Hours)</td>
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<td>Technician Level One</td>
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<td><strong>Relays and Timers</strong> (7.5 Hours)</td>
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<td>Technician Level Two</td>
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<td>Instructor $20</td>
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<tr>
<td><strong>Switches and Photoelectric Devices</strong> (5 Hours)</td>
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<td>Technician Level Two</td>
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Power Generation &C Maintenance Technician Level 3 (continued)

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

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

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

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

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

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

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

PAPERBACK

ISBN
Trainee Guide: $97
Instructor’s Guide: $97
978-0-13-215437-6
978-0-13-215438-3

MODULES

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

Basic Process Control Elements, Transducers and Transmitters (15 Hours)
(Module ID 40402-09; from Industrial Maintenance &I Technician Level Four)
Trainee $20
Instructor $20
ISBN 978-0-13-609140-0

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

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

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

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

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
Instructor’s Guide: $97
978-0-13-215437-6
978-0-13-215438-3

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

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

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Digital Logic Circuits (10 Hours)
(Module ID 12401-03; from Instrumentation Level Four, Second Edition)
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Calibrate Supervisory Instrumentation Elements (10 Hours)
(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)
(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.

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Introduction to Piping Components (5 Hours)
(Module ID 32202-07; from Industrial Maintenance Mechanic Level Two)
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Copper and Plastic Piping Practices (5 Hours)
(Module ID 32203-07; from Industrial Maintenance Mechanic Level Two)
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Instructor $20

Curriculum Notes
• 225 Hours (Includes 100 hours of Power Industry Fundamentals, which is a prerequisite for Level 1 completion and must be purchased separately. See p. 89 for more information.)
• Published: 2010
• Downloadable instructor resources that include module tests, PowerPoint®, and performance profile sheets are available at www.nccer.org/irc.


Instructor’s Guide: $77  978-0-13-215408-6
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To address the need for one standardized and nationally recognized Power Line Worker curriculum, NCRC 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.

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(MODULE ID 49107-11) Covers the specialized tools used by line workers, including hat 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)

(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.

Introduction to Electrical Test Equipment (20 Hours)

(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.

Setting and Pulling Poles (20 Hours)
Instructor S20 ISBN 978-0-13-266349-6

(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.

Introduction to Electrical Circuits (7.5 Hours)
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Instructor S20 ISBN 978-0-13-266341-0

(MODULE ID 49103-11) Provides a general introduction to electricity and DC circuits, including theory of voltage, current, and resistance, basic DC circuits, and Ohm’s law. Also introduces the test equipment used in power line work.

Introduction to Electrical Theory (7.5 Hours)

(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)
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Instructor S20 ISBN 978-0-13-266343-4

(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)
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Instructor S20 ISBN 978-0-13-266344-1

(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.

Setting and Pulling Poles (20 Hours)
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(MODULE ID 49110-11) 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 packing device.

Trenching, Excavating, and Boring Equipment (7.5 Hours)

(MODULE ID 49111-11) Describes the types of conductors used and their applications. Also includes information on the installation of cross-arms, transformers, and conductors.

Introduction to Electrical Test Equipment (20 Hours)

(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 (20 Hours)
Trainee S20 ISBN 978-0-13-266338-0
Instructor S20 ISBN 978-0-13-266352-6

(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.
Underground Residential Distribution (URD) Systems (30 Hours)
(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)
(Module ID 80205-11) Describes the methods and procedures used in terminating single-phase and three-phase aerial and URD systems at residential and commercial customer locations. Includes coverage of revenue meters and street light connections.

Distribution Line Maintenance (50 Hours)
(Module ID 80206-11) Describes the inspection process and the methods and procedures used to inspect and maintain poles, conductors, and equipment used in aerial and URD systems. Includes coverage of transformer testing; location and correction of faults in URD systems; load management systems; and protective device coordination.

Three-Phase URD Systems (25 Hours)
Trainee $20  ISBN 978-0-13-296760-0
(Module ID 80302-12) Covers safety practices associated with three-phase URD systems; describes vault and manhole applications; and explains different transformer configurations and sectionizing equipment used in three-phase URD systems. Also covers three-phase cables and how cable is pulled through conduit.

System Protection and Monitoring (7.5 Hours)
(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)
(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)
(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)
(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.

Introduction to Substations (10 Hours)
(Module ID 82201-12; from Power Line Worker: Substation Level Two) Provides an overview of the different components found in substations. Safe work practices and precautions associated with substation and grounding grid expansion.

Managing Electrical Hazards (12.5 Hours)
Instructor $22  ISBN 978-0-13-294917-0
(Module ID 26501-12; from Electrical, Second Edition) 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.

Conductor Terminations and Splicing (7.5 Hours)
Instructor $20  ISBN 978-0-13-296786-0
(Module ID 82202-12) Identifies the many types, sizes, and applications of conductors and cables. Fiber-optic cable is also introduced. Reviews the use of cable drawings and schedules. Provides coverage of the methods of routing cables underground in the substation environment.

Conduit Bending (15 Hours)
(Module ID 26204-11; from Electrical Level Two, Seventh 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.

Conductor Installations (10 Hours)
Instructor $20  ISBN 978-0-13-296614-1
(Module ID 26206-11; from Electrical Level Two, Seventh 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)
(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.

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Intermediate Rigging (10 Hours)
(Module ID 83201-11; from Intermediate Rigger, Second Edition)
Trainee S20  ISBN 978-0-13-296618-1
Instructor S20  ISBN 978-0-13-296615-0

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.

Trainee Guide: $97
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•  30  Hours
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Intermediate Rigger, Second Edition
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978-0-13-296792-1

Traditions and Conductor Terminations, and Splicing (25 Hours)
Instructor S20  ISBN 978-0-13-296801-0
(Module ID 82304-12) Describes the procedures and materials required to prepare and complete terminations and splices on insulated and non-insulated conductors and cables. Coverage is provided for both medium- and high-voltage circuits. Hydraulic presses and crimpers are introduced, along with hi-pot testing procedures for terminations and splices.

Equipment Testing and Maintenance (30 Hours)
Instructor S20  ISBN 978-0-13-296802-7
(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)
Instructor S20  ISBN 978-0-13-296803-4
(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 substations is included.

Instructor’s Guide: $97
Trainee Guide: $97
978-0-13-274266-5

Transmission Structure Rigging (17.5 Hours)
Instructor S20  ISBN 978-0-13-296771-6
(Module ID 81201-11) Covers rigging equipment and practices specific to transmission structures. Coverage includes slings, crane stability, and the safe use of personnel platforms.

Transmission Structure Erection (50 Hours)
Trainee S20  ISBN 978-0-13-274276-4
Instructor S20  ISBN 978-0-13-274280-1
(Module ID 81202-11) Describes the erection requirements for various types of transmission structures, including steel towers, wood structures, and different types of poles. Covers general construction requirements, as well as right-of-way clearing, foundations, framing and erection, guys and anchoring, and grounding and bonding.

Transmission Equipment Installation (50 Hours)
Trainee S20  ISBN 978-0-13-274277-1
Instructor S20  ISBN 978-0-13-274281-8
(Module ID 81203-11) Focuses on the safe installation of insulators and conductors. Coverage includes stringing and splicing of conductors, conductor terminations, conductor sagging, clippin in, and the installation of accessories such as vibration dampers, spacers, warning lights, and day markers.

Training in the field is conducted under the supervision of skilled professionals. Basic construction skills and safety awareness are covered. Additional coverage includes litigation and loss prevention. A discussion of corona and how proper installation techniques can prevent it is also included.
TRANSMISSION

MODULES

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

Construction, Maintenance, and Repair – Live-Line Barehand (40 Hours)

Trainee $20
Instructor $20

Construction, Maintenance, and Repair – Hot Stick (80 Hours)

Trainee $20
Instructor $20
ISBN 978-0-13-296777-8

Lift Planning (40 Hours)

Trainee $20
Instructor $20

Construction, Maintenance, and Repair – Hot Stick

(80 Hours)

Trainee $20
Instructor $20
ISBN 978-0-13-296777-8

(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)

Trainee $20
Instructor $20

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 after 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.

Introduction to Safety (10 hours)

Trainee $20
Instructor $20

(Module ID 75101-13) Describes the basic precautions necessary to avoid electrical shock, arc, and blast hazards. It also describes the lockout/tagout procedure.

Confined Spaces and Excavations (5 hours)

Trainee $20
Instructor $20

(Module ID 75120-13) Covers safety precautions related to work 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
Instructor $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
Instructor $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
Instructor $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.
Field Safety (continued)

**Steel Erection (2.5 hours)**
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(Module ID 75110-13) Covers common safety precautions related to steel-erection work, including controlled decking zones, hazardous materials and equipment precautions, tool safety, and appropriate personal protective equipment.

**Concrete and Masonry (2.5 hours)**
Trainee $20  
Instructor $20  
(Module ID 75119-13) Covers 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.

**Heavy Equipment, Forklift, and Crane Safety (5 hours)**
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ISBN 978-0-13-382410-0  
(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.

**Introduction to Materials Handling (5 hours)**
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(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.

**Basic Safety**

(Construction Site Safety Orientation)

12.5 Hours  
Revised: 2015  
Module ID 00101-15  
Instructor $20  
Trainee $20  
This module, from Core Curriculum, replaces the Safety Orientation book. See p. 14 for more information.

**Managing Electrical Hazards**

COMING SOON!

12.5 Hours  
Updated: 2018, Fourth Edition  
Module ID 26501-18  
PAPERBACK  
Instructor’s Guide: $25  
Trainee Guide: $25  
See p. 25 for more information.

**Steel Erection**

V1 SAFETY TECHNOLOGY  
VOLUME 1  
Participant Guide: $20  
Instructor’s Guide: $20  

**Introduction to Safety Technology (2.5 Hours)**

(Module ID 75201-03) Describes the roles and responsibilities of the safety technician. Explains three levels of accident causation, accident cost impact, safety program components, and government regulatory requirement impact on the construction industry.

**Hazard Recognition, Evaluation, and Control (2.5 Hours)**

(Module ID 75202-03) Presents techniques used to recognize hazards, unsafe acts, and unsafe conditions on the job site. Explains how to evaluate acceptable job-site risk levels and introduces the seven major methods of hazard control.

**Risk Analysis and Assessment (2.5 Hours)**

(Module ID 75203-03) Focuses on the relationship between human behavior and work-site safety. Describes the factors involved in performance analysis and the techniques used to coach and counsel workers with performance problems.

**Inspections, Audits, and Observations (2.5 Hours)**

(Module ID 75204-03) Introduces the roles and responsibilities of the safety technician with regard to on-site inspections, audits, and observations. Explains the purpose of safety inspections and how to properly conduct safety audits and employee observations.

**Employee Motivation (2.5 Hours)**

(Module ID 75205-03) Stresses the importance of effectively communicating safety policies and procedures to all employees on the job site. Discusses how to provide employee recognition, discipline, and motivation.

**Site-Specific ES&H Plans (2.5 Hours)**

(Module ID 75206-03) Environmental Safety and Health (ES&H) plans must be modified to meet job-specific conditions. Explains how to make these modifications, coordinate implementation of ES&H plans, identify job-specific hazards and requirements using pre-bid checklists, and evaluate hazard risks.

**Emergency Action Plans (2.5 Hours)**

(Module ID 75207-03) Focuses on the basics of emergency action plans and media communications.

**JSAs and TSAs (2.5 Hours)**

(Module ID 75208-03) Covers the purposes and differences between job safety analyses and task safety analyses. Explains how to properly conduct safety analyses.

**New Safety Technology, 2nd Edition**

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### VOLUME 3

**Safety Orientation and Training** (2.5 Hours)
(Module ID 75209-03) Covers the basics of safety training program coordination as it teaches participants to effectively implement safety training.

**Work Permit Policies** (2.5 Hours)
(Module ID 75210-03) Focuses on the roles and responsibilities of the safety technician with regard to work permit policies. Discusses safety technicians’ permit-related roles in hot work, confined-space work, excavation work, electrical hot work, and lockout/tagout procedures.

**Confined-Space Entry Procedures** (2.5 Hours)
(Module ID 75211-03) Stresses the safety requirements of confined-space work. Describes permit, entry, emergency, and rescue procedures. Also covers the main types of atmospheric hazards and the procedures used for testing for them in confined spaces.

**Safety Meetings** (2.5 Hours)
(Module ID 75212-03) Explains how to effectively communicate safety issues and concerns to workers through safety meetings. Presents methods for using safety meetings to implement corrective actions to unsafe practices and behavior.

### VOLUME 4

**Accident Investigation: Policies and Procedures** (2.5 Hours)
(Module ID 75213-03) Explains the connection between accident investigation and accident prevention and describes the purposes and uses of accident investigations. Teaches participants to properly conduct accident investigation interviews and fill out related forms.

**Accident Investigation: Data Analysis** (2.5 Hours)
(Module ID 75214-03) Expands on the concept of accident investigation as a preventative tool. Participants study and practice the methods commonly used for performing accident investigation data analysis.

**Recordkeeping** (2.5 Hours)
(Module ID 75215-03) Accurate record keeping is essential for OSHA compliance. Participants learn to follow OSHA recordkeeping requirements, and to properly document work-related illnesses and injuries using the appropriate OSHA forms.

### VOLUME 5

**OSHA Inspection Procedures** (2.5 Hours)
(Module ID 75216-03) Focuses on the safety technician’s role during OSHA inspections. Covers the process and purpose of OSHA site inspections. Explains the difference between focused and wall-to-wall inspections, the appropriate follow-up actions resulting from an inspection, and the consequences of OSHA citations, violations, and fines.

**ES&H Data Tracking and Trending** (2.5 Hours)
(Module ID 75217-03) Describes the traditional and proactive methods of measuring safety performance. Participants learn to analyze data to identify safety program strengths and isolate areas needing improvement.

**Environmental Awareness** (2.5 Hours)
(Module ID 75218-03) Introduces ways to minimize hazardous-waste production and prevent water and soil contamination. Covers the training and medical surveillance requirements for personnel working with materials such as hazardous waste, lead, asbestos, and silica. Also covered are the primary types of environmental problems and the hazardous-waste shipping requirements common on a construction site.
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