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ORDERING AND CUSTOMER SERVICE

Ordering and Customer Service ..... inside back cover

Letter from the Chairman of the Board

Charles P. Reid
2017 Chairman of the
NCCER Board of Trustees

For over 20 years, NCCER has developed craft training curricula based on industry needs. Whether it is new curricula, revisions, code updates, international translations or instructor resources, NCCER is committed to providing the most comprehensive and up-to-date training materials for the construction and maintenance industries. Recognizing the ever-growing role technology plays in industry and education, one of NCCER's five-year strategic initiatives is to lead technology, innovation and state-of-the-art craft workforce development delivery in the construction industry. As part of this initiative, NCCER released its new Registry System in the third quarter of 2016 and more recently, a mobile-friendly website.

In 2017, NCCER is set to release phase two of the new Registry System and a new, progressive testing platform. In addition, the ongoing expansion of NCCERconnect, an enhanced Instructor Resource Center and a new mobile credentialing system coming at the end of the year will cap-off our evolving innovative additions. NCCER will continue to leverage technology to bring state-of-the-art credentialing, products and services to all our stakeholders faster and more efficiently.

The 2017 catalog includes revisions to Electrical, Fundamentals of Crew Leadership and Mechanical Insulating, with Electrical being NCCER's first curriculum to release all four levels at the same time. In response to international demand, 32 more titles have been translated into Spanish and all translated titles will be available domestically this year beginning in March.

NCCER is also pleased to announce the release of a completely revamped pipeline program that simplifies the process for operator qualification through focused covered task training modules. The updated pipeline program starts on page 73 and includes 127 covered task e-books and a new career pathways diagram for those seeking skills development.

Finally, as NCCER continues to listen to the needs of the industry, two new programs were released to assist in areas of high demand, Construction Workforce Development Professional and Mentoring for Craft Professionals. Both titles are available at shop.nccer.org.

Throughout the years, NCCER has exceled at serving the industry and its workforce development needs. By continuously adapting and evolving, NCCER has become one of the most highly sought after and trusted training programs in the construction industry. I look forward to serving as NCCER chairman and continuing the legacy of providing superior workforce development resources.

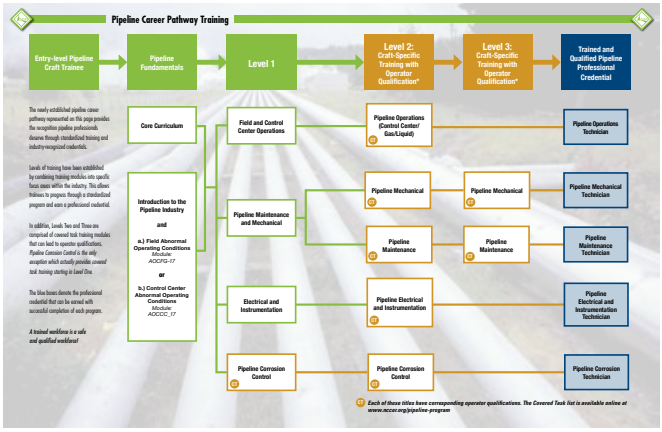
Charles P. Reid
CEO of Current Builders
2017 Chairman of the NCCER Board of Trustees

NCCER is a not-for-profit education foundation created to help address the critical workforce shortage facing the construction industry and to develop industry-driven standardized craft training programs with portable credentials. With the support of its publishing partner Pearson, NCCER leads the industry in building a safe, productive and sustainable workforce of craft professionals.

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.nccer.org.**

SPRING 2017



Check out the new Pipeline Career Pathway on pg. 74

NCCER's Enhanced Pipeline Program

This new program allows one easy way to train, test and qualify your workforce. Check out page 79 to see a list of the covered task training modules and the newly developed Pipeline Career Pathway with a full curriculum to support it.

Also Coming in Spring 2017

NCCER is expanding the selection of domestic Spanish titles. Check out the updated Spanish titles and available tests under the Updates section on the Online Bookstore at **www.nccer.org/bookstore.**

SUMMER 2017

All Four Levels Releasing at the Same Time!

For the first time ever, all four levels of a curriculum will release at the same time! The NCCER Electrical program has been completely revised and updated to the 2017 NEC.

Next Step for Craft Professionals on their Career Path to Success!

Prepare your craft professionals for foreman and crew leader positions with the updated Fundamentals of Crew Leadership. This program has been updated and revised to assist in training the next generation of project leaders.

Thank You

NCCER would like to thank the Subject Matter Experts from the following companies who provided their expertise and assistance in developing and revising this year's curricula.

ABC National
ABC Northern California Chapter
ABC Pelican Chapter
Alaska Training Center
American Petroleum Institute
Bay LTD
Bishop State Community College
Bo-Mac Contractors, Ltd.
Brace Industrial Group
Brock Services LLC
Carolina Bridge Company, Inc.
Central Louisiana Technical Community College
Central NDT
Claddagh Enterprises
Construction Craft Academy
CP Masters
EMS USA, Inc.
Enbridge Pipelines, Inc.
Enhance Co.
Enterprise
Exelon Generation
Faith Technologies, Inc.
Flint Energy Services, Inc.
Gaylor Electric, Inc.
Industrial Construction & Engineering Co.
Insulation Specialties, Inc.
Jacobs Field Services
Jomax Construction
KBR Industrial Services
Kelley Construction, Inc.
Kinder Morgan, Inc.
L&C Insulation
L.E. Bell Construction Co., Inc.
Lauren Engineers & Constructors, Inc.
Lee College
Lincoln Electric Company
LPR Construction
Marathon Pipe Line
MasTec, Inc.
Midwestern Contractors
National Insulation Association
North American Crane Bureau, Inc.
Northeast Community College
Northern Industrial Training LLC
OneOK
Orion Marine Group
Petrin Corporation
Pittsburg State University
Plains All-American Pipeline
Praxair Services
Protech EIS
Safety Advantage, LLC
Safety Council of Texas City
SCE, Inc.
Southern Tier Insulations
Southland Safety, LLC
Spec-Weld Technologies
Starcon
Sunoco Logistics, L.P.
Sunoco Pipeline
The Haskell Company
Thorco Holdings, LLC
TIC - The Industrial Company
Toledo Refining Co. LLC
Tri-City Electrical Contractors
University of Florida, M.E. Rinker, Sr. School of Construction Management
URS/Flint Energy
Zachry Group

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 6,400 Master Trainers and over 66,000 craft instructors within NCCER's network.

Standardized Curricula

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

Industry-Recognized Credentials

The NCCER Registry System is a credentialing and certification system that assures portability of skills. It provides transcripts, certificates and wallet cards for individuals who successfully complete any NCCER standardized training program conducted by an NCCER accredited organization. These valuable industry credentials benefit students as they seek employment and build their careers. Nearly 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. Free interactive and downloadable resources are available on byf.org.

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
  - Tower
- Industrial Carpenter*
- Industrial Coating and Lining Application Specialist:
  - Level 1
  - Level 2
- Industrial Electrician*
- Industrial Insulator*
- Industrial Ironworker
- Industrial Maintenance Electrical and Instrumentation Technician
- Industrial Maintenance Mechanic
- Industrial Maintenance Support Mechanic
- Industrial Millwright
- Industrial Painter
- Industrial Pipefitter*
- Instrumentation Fitter
- Instrument Technician
- Masonry
- Plumber
- Power Generation:
  - Maintenance Electrician
  - Maintenance Mechanic
- Power Line Worker:
  - Substation
  - Distribution
  - Transmission
- Reinforcing Ironworker*
- Scaffold Builder*

Management

- Foreman
- Supervisor
- Sustainable Construction Supervisor

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)

OSHA® Officially Recognized by Federal OSHA

ANSI Accredited Program #0763 PERSONNEL CERTIFICATION

ABC Associated Builders and Contractors, Inc.

AGC of America THE ASSOCIATED GENERAL CONTRACTORS OF AMERICA Quality People. Quality Projects.

Tower Crane Operator

- Three equipment-specific certifications

Rigger

- Three-level certification program

Signal Person

- Certification program

NCCER's curriculum offers several features to make tailoring your craft training program to your needs easy and efficient:

Pearson Collections

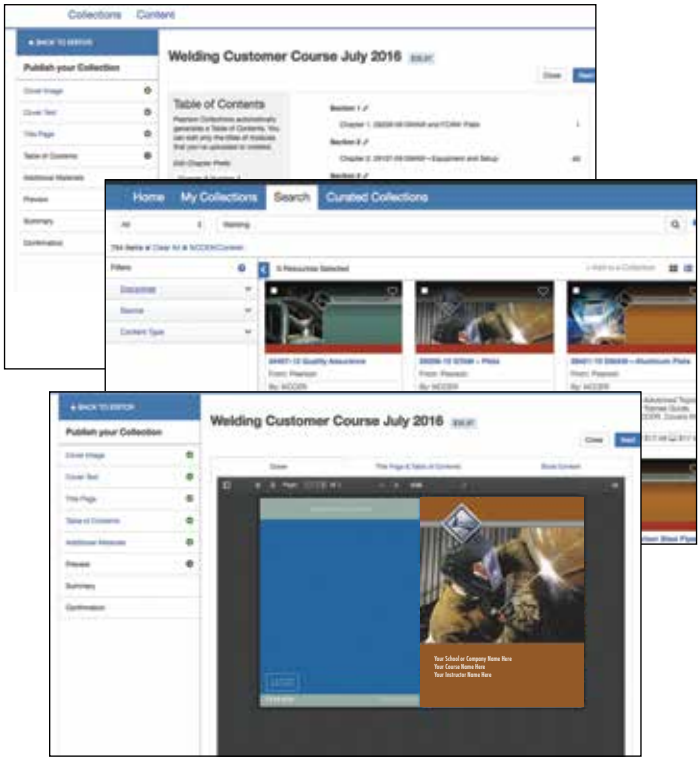
Select your ideal content, align it with your syllabus, then publish and share with your students.

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.



Online Bookstore

Visit the online bookstore to browse our catalog, access help and support, find how-to videos and much more. For the most up-to-date information on print and digital solutions, select the Updates tab on the top navigation bar.

Explore the online bookstore now at www.nccer.org/bookstore.

Instructor Resources

The printed Instructor's Package includes lesson plans and an instructor's copy of the Trainee Guide with an access code to download TestGen software, module exams, PowerPoint® presentations and Performance Profile Sheet from www.nccerirc.com. To order instructor resources, contact your Pearson NCCER Executive Director.

Visit our Instructor Resource Center at www.nccerirc.com for more information.

Your NCCER Online Solution!

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 include email, document uploading, announcements, gradebook and instructor tools.

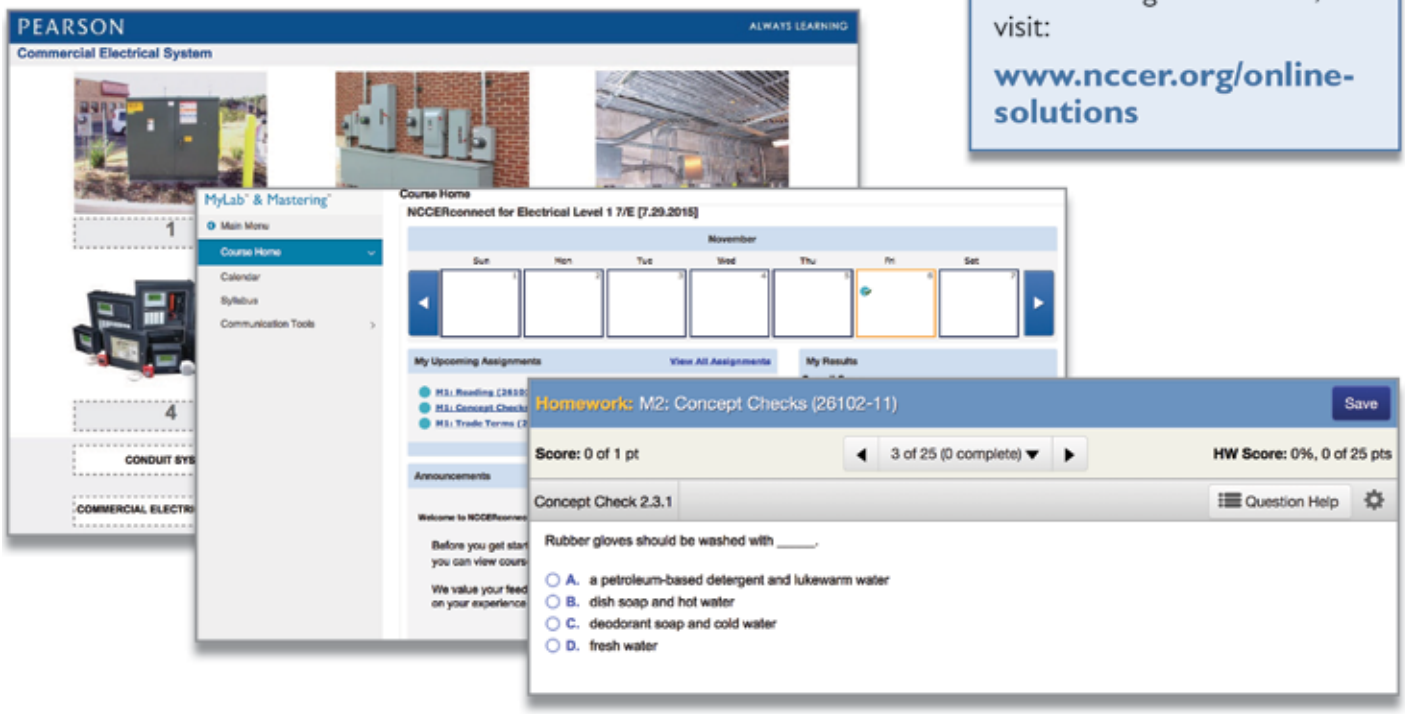
NCCERconnect

NCCERconnect is currently available with eText for the following crafts:

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

For the most current updates and ordering information, visit:

www.nccer.org/online-solutions

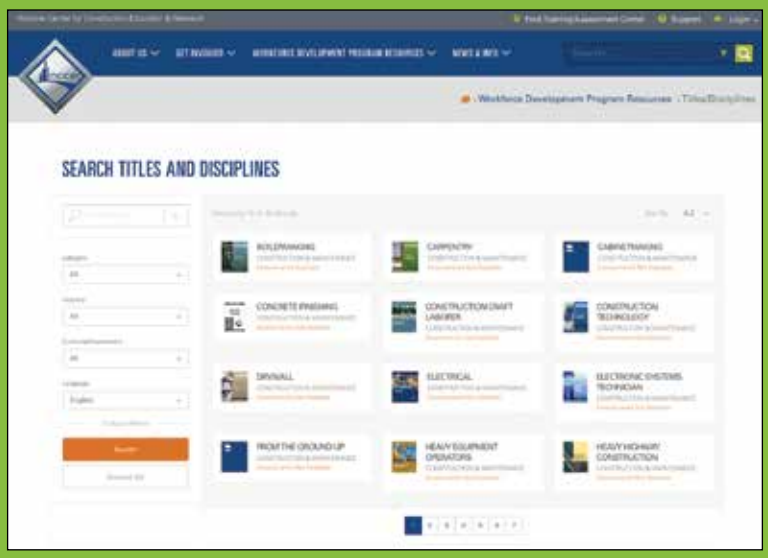


Contact your Pearson representative for details or visit www.nccerconnect.com.

New Registry System

The new system is up, running and ready for the New Year! Visit **registry.nccer.org** to log in and access the new features like the easy to use dashboard and real-time records management. Stay up-to-date with continued improvements to NCCER's Registry System by joining NCCER's mailing list at nccer.org.

Thank you for your support and patience during the transition to the new system.



One-stop-shop for all your workforce development needs - nccer.org

Enhanced Website

Check out the big changes to nccer.org! Several key features on the website include:

- Improved Find a Training and Assessment Center
- New Workforce Development Program Resources section with all-inclusive Title and Discipline pages
- Integrated mobile responsiveness to improve accessibility on your smartphone or tablet
- And much more!

For more information on how to make the most of the redesigned website, visit the nccer.org and click "Support" on the top right. Training videos and documents will be available on NCCER's support webpage.

NCCER Testing System

You asked and we listened. Coming Spring 2017, NCCER will launch an all new online testing system. The new system will allow instructors to distribute, grade and submit exams quickly and easily. To find out more about this service, visit **nccer.org/myNCCER** and click on NCCER Testing System.

Have a question? We want to help!

If you have questions or need assistance utilizing NCCER's services, we have a variety of customer service options:

- **24/7:** Visit NCCER's Support page at **support.nccer.org** to view How-To documents, videos and self-help resources.
- **Monday – Friday, 8:30 am – 5:30 pm EST:**
  - Use the chat feature on nccer.org to talk with a live representative.
  - Call 888.622.3720 to speak with NCCER's customer service department.

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 curriculum section at www.nccer.org:

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

Module ID Numbers

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 (15) 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.

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

CORE CURRICULUM

INTRODUCTORY CRAFT SKILLS

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
- New printed Instructor's Package includes lesson plans and instructor's copy of Trainee Guide with access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.
- A Spanish translation of the fifth edition is available. Please see NCCER's online catalog for more information.
- A basic construction math workbook with practice problems is included with the Instructor's Package.

HARDCOVER	ISBN
Trainee Guide: $57	978-0-13-413143-6
PAPERBACK	**ISBN**
Trainee Guide: $54	978-0-13-413098-9
Instructor's Package: $54	978-0-13-429634-0
NCCERconnect Access Card: $54	978-0-13-423592-9
NCCERconnect + Hardcover Trainee Guide: $82	978-0-13-428567-2
NCCERconnect + Paperback Trainee Guide: $79	978-0-13-439192-2

MODULES

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

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

Trainee $20 ISBN 978-0-13-407556-3
Instructor $20 ISBN 978-0-13-412939-6
(Module ID 00101-15) Presents basic jobsite safety information to prepare workers for the construction environment. Describes the common causes of workplace incidents and accidents and how to avoid them. Introduces common personal protective equipment, including equipment required for work at height, and its proper use. Information related to safety in several specific environments, including welding areas and confined spaces, is also provided.

Introduction to Construction Math *(10 Hours)*

Trainee $20 ISBN 978-0-13-413164-1
Instructor $20 ISBN 978-0-13-414999-8
(Module ID 00102-15) Reviews basic math skills related to the construction trades and demonstrates how they apply to the trades. Covers multiple systems of measurement, decimals, fractions, and basic geometry.

Introduction to Hand Tools *(10 Hours)*

Trainee $20 ISBN 978-0-13-412937-2
Instructor $20 ISBN 978-0-13-412886-3
(Module ID 00103-15) Introduces common hand tools used in a variety of construction crafts. Identifies tools and how to safely use them. Also presents proper hand tool maintenance.

Introduction to Power Tools *(10 Hours)*

Trainee $20 ISBN 978-0-13-412901-3
Instructor $20 ISBN 978-0-13-412902-0
(Module ID 00104-15) Identifies and describes the operation of many power tools common in the construction environment. Provides instruction on proper use, as well as safe-handling guidelines and basic maintenance.

Introduction to Construction Drawings *(10 Hours)*

Trainee $20 ISBN 978-0-13-412903-7
Instructor $20 ISBN 978-0-13-412904-4
(Module ID 00105-15) Introduces the basic terms, components, and symbols of construction drawings, as well as the most common drawing types. Also covers the interpretation and use of drawing dimensions.

Introduction to Basic Rigging *(7.5 Elective Hours)*

Trainee $20 ISBN 978-0-13-412905-1
Instructor $20 ISBN 978-0-13-412900-6
(Module ID 00106-15) Provides basic information related to rigging and rigging hardware, such as slings, rigging hitches, and hoists. Emphasizes safe working habits in the vicinity of rigging operations.

Basic Communication Skills *(7.5 Hours)*

Trainee $20 ISBN 978-0-13-412899-3
Instructor $20 ISBN 978-0-13-412898-6
(Module ID 00107-15) Provides techniques for effective communication on the job. Includes examples that emphasize the importance of both written and verbal communication skills. Describes the importance of reading skills in the construction industry and discusses effective telephone and email communication skills.

Basic Employability Skills *(7.5 Hours)*

Trainee $20 ISBN 978-0-13-412896-2
Instructor $20 ISBN 978-0-13-412895-5
(Module ID 00108-15) Describes the opportunities offered by the construction trades. Discusses critical thinking and essential problem-solving skills. Also identifies and discusses positive social skills and presents information on computer systems and their industry applications.

Introduction to Material Handling *(5 Hours)*

Trainee $20 ISBN 978-0-13-412892-4
Instructor $20 ISBN 978-0-13-412887-0
(Module ID 00109-15) Describes the hazards associated with handling materials and provides techniques to avoid both injury and property damage. Also introduces common material-handling equipment.

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

PAPERBACK	ISBN
Trainee Guide: $30	978-0-13-227298-8
Instructor's Edition: $30 *(includes Resource CD)*	978-0-13-227300-8

Applied Construction Math: A Novel Approach features a story that students can relate to and math skills they never thought they could grasp. Its innovative style motivates students to follow the lessons by associating math with events they may encounter in their own lives. Students will see that learning math can be exciting as they follow along with Mr. Whyte and his construction class while they build the perfect house. Thirteen chapters teach basic math skills, including:

- 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

Basic Safety

(Construction Site Safety Orientation)

12.5 Hours
Revised: 2015
Module ID 00101-15

PAPERBACK	ISBN
Trainee $20	978-0-13-407556-3
Instructor $20	978-0-13-412939-6

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

Tools for Success

Critical Skills for the Construction Industry

Revised: 2009, Third Edition

PAPERBACK	ISBN
Trainee Workbook: $32	978-0-13-610649-4
Instructor's Handbook: $32	978-0-13-610650-0

This workbook is designed for employees entering the construction industry and has been reviewed and updated with input from construction and training professionals.

The Instructor's Handbook includes an annotated instructor's outline, recommended teaching schedules, answers to quizzes, and tips and ideas for enhancing class activities.

Your Role in the Green Environment

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

PAPERBACK	ISBN
Trainee Guide: $30	978-0-13-294863-0
Instructor's Guide: $30	978-0-13-294930-9

- New printed Instructor's Guide includes lesson plans and instructor's copy of Trainee Guide with an access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

See p. 65 for more information

Boilermaking

L1 BOILERMAKING

LEVEL 1

Curriculum Notes

- 182.5 Hours (Includes 72.5 hours of *Core Curriculum*, which is a prerequisite for Level 1 completion and must be purchased separately. See p. 11 for ordering information.)
- Revised: 2010, Second Edition
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $67	978-0-13-213702-7
Instructor's Guide: $67	978-0-13-213704-1

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 Boilermaking *(10 Hours)*
Trainee $20 ISBN 978-0-13-213693-8
Instructor $20 ISBN 978-0-13-213738-6
(Module ID 34101-10) Provides an overview of the boilermaker craft, including a description of career opportunities.

Boilermaking Safety *(12.5 Hours)*
Trainee $20 ISBN 978-0-13-213694-5
Instructor $20 ISBN 978-0-13-213739-3
(Module ID 34102-10) Covers safety issues specific to boilermakers on the job.

Boilermaking Tools *(15 Hours)*
Trainee $20 ISBN 978-0-13-213696-9
Instructor $20 ISBN 978-0-13-213740-9
(Module ID 34103-10) Introduces the hand and power tools used by boilermakers, and the associated safety concerns.

Basic Materials *(10 Hours)*
Trainee $20 ISBN 978-0-13-213697-6
Instructor $20 ISBN 978-0-13-213741-6
(Module ID 34104-10) Identifies materials used in the construction of boilers, including material properties, standards and codes, and material markings.

Oxyfuel Cutting *(17.5 Hours)*
Trainee $20 ISBN 978-0-13-213698-3
Instructor $20 ISBN 978-0-13-213742-3
(Module ID 34105-10) Explains the safety requirements associated with oxyfuel cutting. Describes straight line, bevel, piercing, and washing techniques.

Cutting and Fitting Gaskets *(12.5 Hours)*
Trainee $20 ISBN 978-0-13-213699-0
Instructor $20 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 ISBN 978-0-13-213700-3
Instructor $20 ISBN 978-0-13-213744-7
(Module ID 34107-10) Describes how to clean and prepare base metals for cutting and welding.

Welding Basics *(22.5 Hours)*
Trainee $20 ISBN 978-0-13-213701-0
Instructor $20 ISBN 978-0-13-213746-1
(Module ID 34108-10) Describes welding and cutting processes and related equipment. Includes filler metals, joint design, and the codes that govern welding practices.

L2 BOILERMAKING

LEVEL 2

Curriculum Notes

- 185 Hours
- Revised: 2011, Second Edition
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-213705-8
Instructor's Guide: $97	978-0-13-213706-5

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.

Boiler Systems and Components *(22.5 Hours)*
Trainee $20 ISBN 978-0-13-257786-1
Instructor $20 ISBN 978-0-13-257797-7
(Module ID 34201-11) Introduces boiler configurations and applications. Identifies boiler components and explains their functions.

Identifying and Installing Valves *(20 Hours)*
Trainee $20 ISBN 978-0-13-257787-8
Instructor $20 ISBN 978-0-13-257798-4
(Module ID 34202-11) Identifies valves found in boiler systems. Describes valve components and explains their functions. Explains how to select, store, handle, and install valves, and describes valve markings and nameplate information.

Pipe Hangers and Supports *(25 Hours)*
Trainee $20 **ISBN 978-0-13-257788-5**
Instructor $20 **ISBN 978-0-13-257799-1**
(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 can supports.

Drawings and Detail Sheets *(15 Hours)*
Trainee $20 **ISBN 978-0-13-257789-2**
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 **ISBN 978-0-13-257790-8**
Instructor $20 **ISBN 978-0-13-257801-1**
(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 **ISBN 978-0-13-257792-2**
Instructor $20 **ISBN 978-0-13-257802-8**
(Module ID 34206-11) Explains how to read symbols on welding drawings, specifications, and welding procedure specifications. Describes the symbols for fillet welds, groove welds, miscellaneous other welds, and non-destructive tests.

Socket Weld Pipe Fabrication *(25 Hours)*
Trainee $20 **ISBN 978-0-13-257793-9**
Instructor $20 **ISBN 978-0-13-257803-5**
(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 **ISBN 978-0-13-257794-6**
Instructor $20 **ISBN 978-0-13-257804-2**
(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 **ISBN 978-0-13-257795-3**
Instructor $20 **ISBN 978-0-13-257805-9**
(Module ID 34209-11) Describes methods used to gain access to boiler tubes needing repair, and to prepare boiler tubes for replacement. Explains how to fit-up a section of boiler tube. Describes welding procedures for making butt welds on standard carbon steel tubes and composite tubes.

Air Carbon Arc Cutting and Gouging *(12.5 Hours)*
Trainee $20 **ISBN 978-0-13-257796-0**
Instructor $20 **ISBN 978-0-13-257806-6**
(Module ID 34210-11) Describes air carbon arc cutting (CAC-A) equipment and processes. Explains how to select and install CAC-A electrodes, and how to prepare the work area and CAC-A equipment for safe operation. Provides instructions for using CAC-A equipment for washing and gouging activities.

L3 BOILERMAKING

LEVEL 3

Curriculum Notes

- 162.5 Hours
- Revised: 2011, Second Edition
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-257824-0
Instructor's Guide: $97	978-0-13-266245-1

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.

Plasma Arc Cutting *(7.5 Hours)*
(Module ID 29103-09; from *Welding Level One*)
Trainee $20 **ISBN 978-0-13-266355-7**
Instructor $20 **ISBN 978-0-13-266365-6**

Boiler Pressure Components *(25 Hours)*
Trainee $20 **ISBN 978-0-13-266356-4**
Instructor $20 **ISBN 978-0-13-266366-3**
(Module ID 34301-11) Describes the pressure components of a boiler system and their locations. Explains the procedures required to repair pressure components of a boiler.

Boiler Nonpressure Components *(12.5 Hours)*
Trainee $20 **ISBN 978-0-13-266357-1**
Instructor $20 **ISBN 978-0-13-266367-0**
(Module ID 34302-11) Describes the nonpressure components of a boiler system and their locations. Explains the procedures required to repair nonpressure components of a boiler.

Boiler Auxiliaries *(25 Hours)*
Trainee $20 **ISBN 978-0-13-266358-8**
Instructor $20 **ISBN 978-0-13-266368-7**
(Module ID 34306-11) Describes the air flow systems within a boiler system and the different fuels used to fire boiler system furnaces. Describes ash removal systems and the equipment used to protect the environment. Covers the feed water system into a boiler and the blow down from a boiler system.

Brick, Refractory, Insulation, and Lagging (BRIL) *(5 Hours)*
Trainee $20 **ISBN 978-0-13-266359-5**
Instructor $20 **ISBN 978-0-13-266369-4**
(Module ID 34305-11) Describes types of BRIL and explains their functions. Also addresses hazards associated with BRIL.

Advanced Tube Work *(20 Hours)*
Trainee $20 **ISBN 978-0-13-266360-1**
Instructor $20 **ISBN 978-0-13-266371-7**
(Module ID 34303-11) Explains the methods used to identify problem tubes and extract them. Also describes the methods used for replacing and plugging tubes.

Testing Piping Systems and Equipment *(20 Hours)*
Trainee $20 **ISBN 978-0-13-266361-8**
Instructor $20 **ISBN 978-0-13-266372-4**
(Module ID 34308-11) Lists pretest requirements for boiler system piping systems and equipment. Describes service and flow tests, head pressure tests, and hydrostatic tests performed on boiler system piping systems and equipment.

Rigging *(22.5 Hours)*
(Module ID 15206-07; from *Millwright Level Two*)
Trainee $20 **ISBN 978-0-13-266363-2**
Instructor $20 **ISBN 978-0-13-266373-1**

Towers and Exchangers *(25 Hours)*
Trainee $20 **ISBN 978-0-13-266364-9**
Instructor $20 **ISBN 978-0-13-266374-8**
(Module ID 34307-11) Explains the functions of towers and exchangers and the basic distillation process. Describes various types of towers and exchangers and their components.

L4 BOILERMAKING

LEVEL 4

Curriculum Notes

- 165 Hours
- Revised: 2012, Second Edition
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-292141-1
Instructor's Guide: $97	978-0-13-292169-5

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.

Advanced Mechanical Trade Math *(15 Hours)*
Trainee $20 **ISBN 978-0-13-292236-4**
Instructor $20 **ISBN 978-0-13-292246-3**
(Module ID 34401-12) Covers tables of equivalents and units of conversion. Explains the basics of trigonometry and how to apply them to the installation of pipe. Explains how to calculate the weight of objects.

Advanced Rigging *(20 Hours)*
Trainee $20 **ISBN 978-0-13-292237-1**
Instructor $20 **ISBN 978-0-13-292247-0**
(Module ID 34410-12) Explains how to determine the center of gravity for objects to be rigged and how a load's weight and center of gravity affect lifting devices such as cranes. Describes how to use cribbing to support lifted loads. Covers the use of slings and spreader or equalizer bars to lift loads. Describes the tools used to move loads laterally. Explains how to determine the center of gravity of asymmetrical loads.

Advanced Boilermaking Construction Drawings *(20 Hours)*
Trainee $20 **ISBN 978-0-13-292238-8**
Instructor $20 **ISBN 978-0-13-292248-7**
(Module ID 34402-12) Covers symbols and abbreviations used on piping and instrumentation drawings and piping arrangement drawings. Explains how to read and interpret different types of construction drawings. Explains how to sketch an isometric drawing from a plan view drawing, and how to calculate line lengths from isometric drawings.

Advanced Pipe Fabrication *(20 Hours)*
(Module ID 08402-07; from *Pipefitting Level Four*)
Trainee $20 **ISBN 978-0-13-292239-5**
Instructor $20 **ISBN 978-0-13-292249-4**

Stress Relieving *(10 Hours)*
Trainee $20 **ISBN 978-0-13-292240-1**
Instructor $20 **ISBN 978-0-13-292251-7**
(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)*
Trainee $20 **ISBN 978-0-13-292241-8**
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.

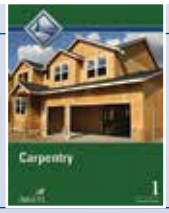
Advanced Exchangers *(25 Hours)*
Trainee $20 **ISBN 978-0-13-292242-5**
Instructor $20 **ISBN 978-0-13-292253-1**
(Module ID 34411-12) Identifies different types of heat exchangers and their components. Describes methods used to test exchangers, and how to pull exchanger bundles. Explains how to replace a flange and a nozzle on an exchanger.

Advanced Towers *(25 Hours)*
Trainee $20 **ISBN 978-0-13-292244-9**
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 distributer for maintenance.

Fundamentals of Crew Leadership *(20 Hours)*
(Module ID 46101-11; see p. 69)
Trainee $43 **ISBN 978-0-13-292245-6**
Instructor $43 **ISBN 978-0-13-292255-5**

Carpentry

L1 CARPENTRY



LEVEL 1

Curriculum Notes

- 225 Hours (Includes 72.5 hours of *Core Curriculum*, which is a prerequisite for Level 1 completion and must be purchased separately. See p. 11 for ordering information.)
- Revised: 2013, Fifth Edition
- New printed Instructor's Package includes lesson plans and instructor's copy of Trainee Guide with access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.
- A Spanish translation of the fourth edition is available. Please see NCCER's online catalog for more information.

HARDCOVER	ISBN
Trainee Guide: $69	978-0-13-340380-0
PAPERBACK	**ISBN**
Trainee Guide: $67	978-0-13-340237-7
Instructor's Package: $67	978-0-13-416620-9
NCCERconnect Access Card: $67	978-0-13-420508-3
NCCERconnect + Hardcover Trainee Guide: $94	978-0-13-427462-1
NCCERconnect + Paperback Trainee Guide: $92	978-0-13-429856-6

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

Orientation to the Trade *(5 Hours)*
Trainee $20 **ISBN 978-0-13-340299-5**
Instructor $20 **ISBN 978-0-13-340309-1**
(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 *(7.5 Hours)*
Trainee $20 **ISBN 978-0-13-340300-8**
Instructor $20 **ISBN 978-0-13-340310-7**
(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 *(7.5 Hours)*
Trainee $20 **ISBN 978-0-13-340301-5**
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 *(20 Hours)*
Trainee $20 **ISBN 978-0-13-340302-2**
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 *(27.5 Hours)*
Trainee $20 **ISBN 978-0-13-340303-9**
Instructor $20 **ISBN 978-0-13-340313-8**
(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 *(20 Hours)*
Trainee $20 **ISBN 978-0-13-340304-6**
Instructor $20 **ISBN 978-0-13-340314-5**
(Module ID 27111-13) Describes procedures for laying out and framing walls, including roughing-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 *(40 Hours)*
Trainee $20 **ISBN 978-0-13-340305-3**
Instructor $20 **ISBN 978-0-13-340315-2**
(Module ID 27112-13) Describes types of roofs and provides instructions for laying out rafters for gable roofs, hip roofs, and valley intersections. Covers stick-built and truss-built roofs. Includes the basics of roof sheathing installation.

Introduction to Building Envelope Systems *(12.5 Hours)*
Trainee $20 **ISBN 978-0-13-340307-7**
Instructor $20 **ISBN 978-0-13-340318-3**
(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**
Instructor $20 **ISBN 978-0-13-340317-6**
(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.

L2 CARPENTRY FRAMING & FINISHING

LEVEL 2

Curriculum Notes

- 210 Hours
- Optional Residential Path: 170 Hours
- Optional Commercial Path: 150 Hours
- Revised: 2013, Fifth Edition
- New printed Instructor's Package includes lesson plans and instructor's copy of Trainee Guide with access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

HARDCOVER	ISBN
Trainee Guide: $99	978-0-13-340465-4
PAPERBACK	**ISBN**
Trainee Guide: $97	978-0-13-340430-2
Instructor's Package: $97	978-0-13-416621-6
NCCERconnect Access Card: $97	978-0-13-442808-6
NCCERconnect + Hardcover Trainee Guide: $124	978-0-13-453971-3
NCCERconnect + Paperback Trainee Guide: $122	978-0-13-453972-0

MODULES

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

Commercial Drawings *Elective for Residential Path (25 Hours)*

Trainee $20 ISBN 978-0-13-377929-5
Instructor $20 ISBN 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 $20 ISBN 978-0-13-377910-3
Instructor $20 ISBN 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 nonbearing walls, partitions, and other applications.

Exterior Finishing *Elective for Commercial Path (35 Hours)*

Trainee $20 ISBN 978-0-13-377909-7
Instructor $20 ISBN 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 *(7.5 Hours)*

Trainee $20 ISBN 978-0-13-377903-5
Instructor $20 ISBN 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 $20 ISBN 978-0-13-377902-8
Instructor $20 ISBN 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.

Doors and Door Hardware *(20 Hours)*

Trainee $20 ISBN 978-0-13-377914-1
Instructor $20 ISBN 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 locksets and door closers. Also discusses the installation of wood doors, folding doors, and pocket doors.

Drywall Installation *(15 Hours)*

Trainee $20 ISBN 978-0-13-377911-0
Instructor $20 ISBN 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 $20 ISBN 978-0-13-377913-4
Instructor $20 ISBN 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 $20 ISBN 978-0-13-377915-8
Instructor $20 ISBN 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 $20 ISBN 978-0-13-377916-5
Instructor $20 ISBN 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 $20 ISBN 978-0-13-377917-2
Instructor $20 ISBN 978-0-13-377929-5
(Module ID 27211-13) Provides detailed instructions for the selection and installation of base and wall cabinets and countertops.

L3 CARPENTRY FORMS

LEVEL 3

Curriculum Notes

- 160 Hours
- Revised: 2014, Fifth Edition
- New printed Instructor's Package includes lesson plans and instructor's copy of Trainee Guide with access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.
- 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
Instructor's Package: $97	978-0-13-416631-5
NCCERconnect Access Card: $97	978-0-13-442809-3
NCCERconnect + Trainee Guide: $122	978-0-13-453970-6

MODULES

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

Properties of Concrete *(10 Hours)*

Trainee $20 ISBN 978-0-13-378674-3
Instructor $20 ISBN 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 curing concrete.

Rigging Equipment *(10 Hours)*

(Module ID 38101-11; from *Basic Rigging*)
Trainee $20 ISBN 978-0-13-378675-0
Instructor $20 ISBN 978-0-13-378686-6

Rigging Practices *(15 Hours)*

(Module ID 38102-11; from *Basic Rigging*)
Trainee $20 ISBN 978-0-13-378676-7
Instructor $20 ISBN 978-0-13-378688-0

Trenching and Excavating *(15 Hours)*

Trainee $20 ISBN 978-0-13-378678-1
Instructor $20 ISBN 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.

Reinforcing Concrete *(15 Hours)*

Trainee $20 ISBN 978-0-13-378679-8
Instructor $20 ISBN 978-0-13-378690-3
(Module ID 27304-14) Explains the selection and uses of different types of reinforcing materials. Describes requirements for bending, cutting, splicing, and tying reinforcing steel and the placement of steel in footings and foundations, walls, columns, and beams and girders.

Foundations and Slabs-On-Grade *(20 Hours)*

Trainee $20 ISBN 978-0-13-378680-4
Instructor $20 ISBN 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 $20 **ISBN 978-0-13-378681-1**
Instructor $20 **ISBN 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 $20 **ISBN 978-0-13-378682-8**
Instructor $20 **ISBN 978-0-13-378693-4**

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

Handling and Placing Concrete *(20 Hours)*

Trainee $20 **ISBN 978-0-13-378683-5**
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)*

Trainee $20 **ISBN 978-0-13-378684-2**
Instructor $20 **ISBN 978-0-13-378695-8**

(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.

L4 CARPENTRY ADVANCED

LEVEL 4

Curriculum Notes

- 182.5 Hours (162.5 Required, 20 Elective)
- Revised 2014, Fifth Edition
- New printed Instructor's Package includes lesson plans and instructor's copy of Trainee Guide with access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-382314-1
Instructor's Package: $97	978-0-13-428576-4
NCCERconnect Access Card: $97	978-0-13-442810-9
NCCERconnect + Trainee Guide: $122	978-0-13-453969-0

MODULES

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

Site Layout One: Differential Leveling *(20 Hours)*

Trainee $20 **ISBN 978-0-13-378698-9**
Instructor $20 **ISBN 978-0-13-378710-8**

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

Site Layout Two: Angular and Distance Measurement *(37.5 Hours)*

Trainee $20 **ISBN 978-0-13-378700-9**
Instructor $20 **ISBN 978-0-13-378711-5**

(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)*

Trainee $20 **ISBN 978-0-13-378702-3**
Instructor $20 **ISBN 978-0-13-378714-6**

(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)*

Trainee $20 **ISBN 978-0-13-378704-7**
Instructor $20 **ISBN 978-0-13-378715-3**

(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)*

Trainee $20 **ISBN 978-0-13-378705-4**
Instructor $20 **ISBN 978-0-13-378717-7**

(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)*

Trainee $20 **ISBN 978-0-13-378706-1**
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, compressor, compactor, and forklift. An overview of general safety, operation, and maintenance procedures is provided.

Introduction to Oxyfuel Cutting and Arc Welding *(20 Elective Hours)*

Trainee $20 **ISBN 978-0-13-378707-8**
Instructor $20 **ISBN 978-0-13-378719-1**

(Module 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)*

Trainee $20 **ISBN 978-0-13-378697-2**
Instructor $20 **ISBN 978-0-13-378709-2**

(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)*

(Module 46101-11; see p. 69)

Trainee $43 **ISBN 978-0-13-378708-5**
Instructor $43 **ISBN 978-0-13-378722-1**

Cabinetmaking

35 Hours
Revised: 2016, Third Edition
Module ID 27501-15

PAPERBACK	ISBN
Trainee Guide: $22	978-0-13-428854-3
Instructor's Guide: $22	978-0-13-428857-4

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-joining techniques, power tools, cabinet doors, shelves, and hardware. Specific guidance is also provided for the installation of laminated countertops.

From the Ground Up

Revised: 2006, Second Edition

PAPERBACK	ISBN
Workbook: $22	978-0-13-229164-4
Instructor's Package: $22	978-0-13-229165-1

Instructor's Package includes workbook plus Instructor's Module with answers to review questions and exercises, cross-references to NCCER performance tests, and numerous teaching tips.

L1 CONCRETE FINISHING

LEVEL 1

Curriculum Notes

- 160 Hours (Includes 72.5 hours of *Core Curriculum*, which is a prerequisite for Level 1 completion and must be purchased separately. See p. 11 for ordering information.)
- Published: 1998
- A Spanish translation is available. Please see NCCER's online catalog for more information.
- Instructor's Guide includes access code to download TestGen software, module exams, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $67	978-0-13-010246-1
Instructor's Guide: $67	978-0-13-010249-2

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.

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

Trainee $20 ISBN 978-0-13-010253-9
Instructor $20 ISBN 978-0-13-010263-8

(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 ISBN 978-0-13-010254-6
Instructor $20 ISBN 978-0-13-010264-5

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

Properties of Concrete *(10 Hours)*

Trainee $20 ISBN 978-0-13-010255-3
Instructor $20 ISBN 978-0-13-010266-9

(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 ISBN 978-0-13-010257-7
Instructor $20 ISBN 978-0-13-010267-6

(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 ISBN 978-0-13-010258-4
Instructor $20 ISBN 978-0-13-010268-3

(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 ISBN 978-0-13-010259-1
Instructor $20 ISBN 978-0-13-010269-0

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

Finishing, Part One *(20 Hours)*

Trainee $20 ISBN 978-0-13-010250-8
Instructor $20 ISBN 978-0-13-010260-7

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

Curing and Protecting Concrete *(5 Hours)*

Trainee $20 ISBN 978-0-13-010261-4
Instructor $20 ISBN 978-0-13-010271-3

(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 ISBN 978-0-13-010262-1
Instructor $20 ISBN 978-0-13-010272-0

(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

LEVEL 2

Curriculum Notes

- 167.5 Hours
- Published: 1999
- Instructor's Guide includes access code to download TestGen software, module exams, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-014860-5
Instructor's Guide: $97	978-0-13-014872-8

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.

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

Trainee $20 ISBN 978-0-13-015047-9
Instructor $20 ISBN 978-0-13-015057-8

(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 ISBN 978-0-13-015048-6
Instructor $20 ISBN 978-0-13-015059-2

(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 ISBN 978-0-13-015049-3
Instructor $20 ISBN 978-0-13-015050-9

(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 reshoring precautions and procedures.

Site Concrete *(30 Hours)*

Trainee $20 ISBN 978-0-13-015040-0
Instructor $20 ISBN 978-0-13-015061-5

(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 ISBN 978-0-13-015051-6
Instructor $20 ISBN 978-0-13-015062-2

(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 ISBN 978-0-13-015052-3
Instructor $20 ISBN 978-0-13-015063-9

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

Superflat Floors *(22.5 Hours)*

Trainee $20 ISBN 978-0-13-015053-0
Instructor $20 ISBN 978-0-13-015064-6

(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 ISBN 978-0-13-015054-7
Instructor $20 ISBN 978-0-13-015065-3

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

Quality Control *(10 Hours)*

Trainee $20 ISBN 978-0-13-015055-4
Instructor $20 ISBN 978-0-13-015067-7

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

Making Repairs *(10 Hours)*

Trainee $20 ISBN 978-0-13-015056-1
Instructor $20 ISBN 978-0-13-015068-4

(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

LEVEL 1

Curriculum Notes

- 172.5 Hours (Includes 80 hours of *Core Curriculum*, which is a prerequisite for Level 1 completion.)
- Updated: 2015, Third Edition
- New printed Instructor's Package includes lesson plans and instructor's copy of Trainee Guide with access code to download TestGen software, module exams, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $67	**978-0-13-413094-1**
Instructor's Package: $67	**978-0-13-430263-8**
Bundle: $105	**978-0-13-430261-4**

(Bundle includes a paperback Trainee Guide of Construction Craft Laborer *Level One and a paperback Trainee Guide of* Core Curriculum.*)*

CORE CURRICULUM

Basic Safety *(12.5 Hours)*
(Module ID 00101-15; from *Core Curriculum)*

Introduction to Construction Math *(10 Hours)*
(Module ID 00102-15; from *Core Curriculum)*

Introduction to Hand Tools *(10 Hours)*
(Module ID 00103-15; from *Core Curriculum)*

Introduction to Power Tools *(10 Hours)*
(Module ID 00104-15; from *Core Curriculum)*

Introduction to Construction Drawings *(10 Hours)*
(Module ID 00105-15; from *Core Curriculum)*

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

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

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

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

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

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

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

L2 CONSTRUCTION CRAFT LABORER

LEVEL 2

Curriculum Notes

- 147.5 Hours
- Updated: 2015, Third Edition

PAPERBACK	ISBN
Trainee Guide: $105	**978-0-13-413096-5**
Instructor's Package: $105	**978-0-13-430262-1**

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

CONSTRUCTION TECHNOLOGY

Curriculum Notes

- 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. 11 for ordering information.)
- Revised: 2016, Fourth Edition
- New printed Instructor's Package includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

HARDCOVER	ISBN
Trainee Guide: $140	**978-0-13-413039-2**
PAPERBACK	**ISBN**
Instructor's Guide: $140	**978-0-13-454300-0**
NCCERconnect Access Card: $140	**978-0-13-448193-7**
NCCERconnect + Hardcover Trainee Guide: $165	**978-0-13-453976-8**

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 *(20 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 27110-13; 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)*

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*)

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. 11 for ordering information.)
- Published: 2007
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.
- 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.

Orientation to the Trade *(5 Hours)*
Trainee $20 ISBN 978-0-13-604843-5
Instructor $20 ISBN 978-0-13-604849-7
(Module ID 45101-07) Reviews the history of the trade, shows examples of the work involved, describes the apprentice program, identifies career opportunities for construction workers, and lists the responsibilities and characteristics a worker should possess.

Construction Materials and Methods *(12 Hours)*
Trainee $20 ISBN 978-0-13-604845-9
Instructor $20 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 $20 ISBN 978-0-13-604846-6
Instructor $20 ISBN 978-0-13-604852-7
(Module ID 45103-07) Covers the selection and installation of insulating materials in walls, floors, and attics. Also covers the uses and installation practices for vapor barriers and waterproofing materials.

Drywall Installation *(25 Hours)*
Trainee $20 ISBN 978-0-13-604847-3
Instructor $20 ISBN 978-0-13-604853-4
(Module ID 45104-07) Discusses types of gypsum drywall, their uses, and the fastening devices and methods used to install them. Describes installing drywall on walls and ceilings using nails, drywall screws, and adhesives. Also covers fire- and sound-rated walls.

Drywall Finishing *(25 Hours)*
Trainee $20 ISBN 978-0-13-604848-0
Instructor $20 ISBN 978-0-13-604854-1
(Module ID 45105-07) Covers the materials, tools, and methods used to finish and patch gypsum drywall, including automatic and manual taping tools.

L2 DRYWALL

LEVEL 2

Curriculum Notes

- 145 Hours
- Published: 2009
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

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.

Commercial Drawings *(25 Hours)*
Trainee $20 ISBN 978-0-13-604855-8
Instructor $20 ISBN 978-0-13-604861-9
(Module ID 45201-09) Focuses on techniques for reading and using architectural and structural drawings and specifications.

Steel Framing *(50 Hours)*
Trainee $20 ISBN 978-0-13-604856-5
Instructor $20 ISBN 978-0-13-604862-6
(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.

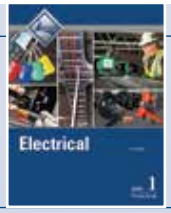
Acoustical Ceilings *(20 Hours)*
Trainee $20 ISBN 978-0-13-604857-2
Instructor $20 ISBN 978-0-13-604863-3
(Module ID 45203-09) Describes the materials, layout, and installation procedures for suspended ceilings used in commercial construction. Also covers ceiling tiles, drywall suspension systems, and pan-type ceilings.

Interior Specialties *(15 Hours)*
Trainee $20 ISBN 978-0-13-604858-9
Instructor $20 ISBN 978-0-13-604864-0
(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 $20 ISBN 978-0-13-604859-6
Instructor $20 ISBN 978-0-13-604830-5
(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 $20 ISBN 978-0-13-604860-2
Instructor $20 ISBN 978-0-13-604831-2
(Module ID 45206-09) Covers the materials, tools, and application methods used for specialized interior finishes, such as sand, marble, clay, and Venetian plaster.

L1 ELECTRICAL



LEVEL 1

REVISED!

Curriculum Notes

- 185 Hours (Includes 72.5 hours of *Core Curriculum*, which is a prerequisite for completion and must be purchased separately. See p. 11 for ordering information.)
- To Be Revised: Summer 2017, Ninth Edition, to reflect 2017 NEC®; visit www.nccer.org/book-updates for up-to-date availability status.
- For Online Instructor Resources visit www.nccerirc.com
- A Spanish translation of the 2008 *NEC*® version is available. Please see NCCER's online catalog for more information.

HARDCOVER	ISBN
Trainee Guide: $69	978-0-13-480473-6
PAPERBACK	**ISBN**
Trainee Guide: $67	978-0-13-473820-8
Instructor's Guide: $67	978-0-13-480497-2

NCCERconnect is available for this edition; visit www.nccer.org/online-solutions for more information

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 Electrical Trade *(2.5 Hours)*
Trainee $20 ISBN 978-0-13-480474-3
Instructor $20 ISBN 978-0-13-480475-0
(Module ID 26101-17) Provides an overview of the electrical trade and discusses the career paths available to electricians.

Electrical Safety *(10 Hours)*
Trainee $20 ISBN 978-0-13-480477-4
Instructor $20 ISBN 978-0-13-480478-1
(Module ID 26102-17) Covers safety rules and regulations for electricians, including precautions for electrical hazards found on the job. Also covers the OSHA-mandated lockout/tagout procedure.

Introduction to Electrical Circuits *(7.5 Hours)*
Trainee $20 ISBN 978-0-13-480479-8
Instructor $20 ISBN 978-0-13-480480-4
(Module ID 26103-17) Introduces electrical concepts used in Ohm's law applied to DC series circuits. Covers atomic theory, electromotive force, resistance, and electric power equations.

Electrical Theory *(7.5 Hours)*
Trainee $20 ISBN 978-0-13-480481-1
Instructor $20 ISBN 978-0-13-480482-8
(Module ID 26104-17) Introduces series, parallel, and series-parallel circuits. Covers resistive circuits, Kirchhoff's voltage and current laws, and circuit analysis.

Introduction to the *National Electrical Code*® *(7.5 Hours)*
Trainee $20 ISBN 978-0-13-480483-5
Instructor $20 ISBN 978-0-13-480485-9
(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)*
Trainee $20 ISBN 978-0-13-480487-3
Instructor $20 ISBN 978-0-13-480486-6
(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
Instructor $20 ISBN 978-0-13-480489-7
(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
Instructor $20 ISBN 978-0-13-480490-3
(Module ID 26108-17) Introduces the types and applications of raceways, wireways, and ducts. Stresses the applicable *NEC*® requirements.

Conductors and Cables *(10 Hours)*
Trainee $20 ISBN 978-0-13-480494-1
Instructor $20 ISBN 978-0-13-480492-7
(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)*
Trainee $20 ISBN 978-0-13-480496-5
Instructor $20 ISBN 978-0-13-480495-8
(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)*
Trainee $20 ISBN 978-0-13-478332-1
Instructor $20 ISBN 978-0-13-478341-3
(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
Instructor $20 ISBN 978-0-13-478340-6
(Module ID 26112-17) Covers proper selection, inspection, and use of common electrical test equipment, including voltage testers, clamp-on ammeters, ohmmeters, multimeters, phase/motor rotation testers, and data recording equipment. Also covers safety precautions and meter category ratings.

Ordering information for *Electrical Level 1*, Eighth Edition:

HARDCOVER	ISBN
Trainee Guide: $69	978-0-13-383005-7
PAPERBACK	**ISBN**
Trainee Guide: $67	978-0-13-382959-4
Instructor's Guide: $67	978-0-13-383004-0
NCCERconnect Access Card: $67	978-0-13-415694-1
NCCERconnect + Hardcover Trainee Guide: $94	978-0-13-439124-3
NCCERconnect + Paperback Trainee Guide: $92	978-0-13-427465-2

ELECTRICAL

LEVEL 2

Curriculum Notes

REVISED!

- 145 Hours
- To Be Revised: Summer 2017, Ninth Edition, to reflect 2017 NEC®; visit www.nccer.org/book-updates for up-to-date availability status.
- For Online Instructor Resources visit www.nccerirc.com

HARDCOVER	ISBN
Trainee Guide: $99	978-0-13-480472-9
PAPERBACK	**ISBN**
Trainee Guide: $97	978-0-13-473821-5
Instructor's Guide: $97	978-0-13-480623-5

NCCERconnect is available for this edition; visit www.nccer.org/online-solutions for more information

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.

Alternating Current *(17.5 Hours)*
Trainee $20 ISBN 978-0-13-478337-6
Instructor $20 ISBN 978-0-13-478338-3
(Module ID 26201-17) Describes forces that are characteristic of alternating-current systems and the application of Ohm's law to AC circuits.

Motors: Theory and Application *(20 Hours)*
Trainee $20 ISBN 978-0-13-478336-9
Instructor $20 ISBN 978-0-13-481319-6
(Module ID 26202-17) Covers AC and DC motors, including the main components, circuits, and connections.

Electric Lighting *(15 Hours)*
Trainee $20 ISBN 978-0-13-478335-2
Instructor $20 ISBN 978-0-13-478334-5
(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.

Conduit Bending *(15 Hours)*
Trainee $20 ISBN 978-0-13-478333-8
Instructor $20 ISBN 978-0-13-478331-4
(Module ID 26204-17) Covers bends in conduit up to 6 inches. Focuses on mechanical, hydraulic, and electrical benders.

Pull and Junction Boxes *(12.5 Hours)*
Trainee $20 ISBN 978-0-13-480498-9
Instructor $20 ISBN 978-0-13-480507-8
(Module ID 26205-17) Explains how to select and size pull boxes, junction boxes, and handholes.

Conductor Installations *(10 Hours)*
Trainee $20 ISBN 978-0-13-480499-6
Instructor $20 ISBN 978-0-13-480501-6
(Module ID 26206-17) Covers the transportation, storage, and setup of cable reels; methods of rigging; and procedures for complete cable pulls in raceways and cable trays.

Cable Tray *(7.5 Hours)*
Trainee $20 ISBN 978-0-13-480502-3
Instructor $20 ISBN 978-0-13-480503-0
(Module ID 26207-17) Focuses on *NEC*® installation requirements for cable tray, including cable installations.

Conductor Terminations and Splices *(7.5 Hours)*
Trainee $20 ISBN 978-0-13-480504-7
Instructor $20 ISBN 978-0-13-480505-4
(Module ID 26208-17) Describes methods of terminating and splicing conductors, including preparing and taping conductors.

Grounding and Bonding *(15 Hours)*
Trainee $20 ISBN 978-0-13-480506-1
Instructor $20 ISBN 978-0-13-480508-5
(Module ID 26209-17) Focuses on the purpose of grounding and bonding electrical systems. Thoroughly covers *NEC*® requirements.

Circuit Breakers and Fuses *(12.5 Hours)*
Trainee $20 ISBN 978-0-13-480509-2
Instructor $20 ISBN 978-0-13-480510-8
(Module ID 26210-17) Describes fuses and circuit breakers along with their practical applications. Also covers sizing.

Control Systems and Fundamental Concepts *(12.5 Hours)*
Trainee $20 ISBN 978-0-13-480511-5
Instructor $20 ISBN 978-0-13-480512-2
(Module ID 26211-17) Gives basic descriptions of various types of contactors and relays along with their practical applications.

Ordering information for *Electrical Level 2*, Eighth Edition:

HARDCOVER	ISBN
Trainee Guide: $99	978-0-13-383072-9
PAPERBACK	**ISBN**
Trainee Guide: $97	978-0-13-383065-1
Instructor's Guide: $97	978-0-13-383073-6
NCCERconnect Access Card: $97	978-0-13-415698-9
NCCERconnect + Hardcover Trainee Guide: $124	978-0-13-439123-6
NCCERconnect + Paperback Trainee Guide: $122	978-0-13-427464-5

L3 ELECTRICAL

LEVEL 3

Curriculum Notes REVISED!

- 155 Hours
- To Be Revised: Summer 2017, Ninth Edition, to reflect 2017 NEC®; visit www.nccer.org/book-updates for up-to-date availability status.
- For Online Instructor Resources visit www.nccerirc.com

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-473823-9
Instructor's Guide: $97	978-0-13-480625-9

NCCERconnect is available for this edition; visit www.nccer.org/online-solutions for more information

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 *(17.5 Hours)*
Trainee $20 ISBN 978-0-13-480513-9
Instructor $20 ISBN 978-0-13-480520-7
(Module ID 26301-17) Explains how to calculate branch circuit and feeder loads for residential and commercial applications.

Conductor Selection and Calculations *(15 Hours)*
Trainee $20 ISBN 978-0-13-480514-6
Instructor $20 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 $20 ISBN 978-0-13-480515-3
Instructor $20 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)*
Trainee $20 ISBN 978-0-13-480522-1
Instructor $20 ISBN 978-0-13-480517-7
(Module ID 26304-17) Presents the *NEC*® requirements for equipment installed in hazardous locations.

Overcurrent Protection *(25 Hours)*
Trainee $20 ISBN 978-0-13-480523-8
Instructor $20 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)*
Trainee $20 ISBN 978-0-13-480524-5
Instructor $20 ISBN 978-0-13-480525-2
(Module ID 26306-17) Discusses switchboards and switchgear, including installation, grounding, and maintenance requirements. Includes a set of drawings.

Transformers *(12.5 Hours)*
Trainee $20 ISBN 978-0-13-480527-6
Instructor $20 ISBN 978-0-13-480528-3
(Module ID 26307-17) Discusses transformer types, construction, connections, protection, and grounding.

Commercial Electrical Services *(10 Hours)*
Trainee $20 ISBN 978-0-13-480530-6
Instructor $20 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)*
Trainee $20 ISBN 978-0-13-480531-3
Instructor $20 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)*
Trainee $20 ISBN 978-0-13-480533-7
Instructor $20 ISBN 978-0-13-480535-1
(Module ID 26310-17) Covers installation, termination, and testing of voice, data, and video cabling systems.

Motor Controls *(12.5 Hours)*
Trainee $20 ISBN 978-0-13-480536-8
Instructor $20 ISBN 978-0-13-480537-5
(Module ID 26311-14) Provides information on selecting, sizing, and installing motor controllers. Also covers control circuit pilot devices and basic relay logic.

Ordering information for *Electrical Level 3*, Eighth Edition:

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-383082-8
Instructor's Guide: $97	978-0-13-383545-8
NCCERconnect Access Card: $97	978-0-13-415700-9
NCCERconnect + Trainee Guide: $122	978-0-13-427463-8

L4 ELECTRICAL

LEVEL 4

Curriculum Notes REVISED!

- 180 Hours
- To Be Revised: Summer 2017, Ninth Edition, to reflect 2017 NEC®; visit www.nccer.org/book-updates for up-to-date availability status.
- For Online Instructor Resources visit www.nccerirc.com

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-473822-2
Instructor's Guide: $97	978-0-13-480627-3

NCCERconnect is available for this edition; visit www.nccer.org/online-solutions for more information

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)*
Trainee $20 ISBN 978-0-13-480538-2
Instructor $20 ISBN 978-0-13-480539-9
(Module ID 26401-17) Topics include basic calculation procedures for commercial and residential applications.

Health Care Facilities *(10 Hours)*
Trainee $20 ISBN 978-0-13-480540-5
Instructor $20 ISBN 978-0-13-480541-2
(Module ID 26402-17) Covers the installation of electric circuits in health care facilities, including the requirements for life safety and critical circuits.

Standby and Emergency Systems *(10 Hours)*
Trainee $20 ISBN 978-0-13-480543-6
Instructor $20 ISBN 978-0-13-480544-3
(Module ID 26403-17) Explains the *NEC*® requirements for electric generators and storage batteries.

Basic Electronic Theory *(10 Hours)*
Trainee $20 ISBN 978-0-13-480546-7
Instructor $20 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 $20 ISBN 978-0-13-480547-4
Instructor $20 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)*
Trainee $20 ISBN 978-0-13-480549-8
Instructor $20 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.

Advanced Controls *(20 Hours)*
Trainee $20 ISBN 978-0-13-480551-1
Instructor $20 ISBN 978-0-13-480552-8
(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 ISBN 978-0-13-480553-5
Instructor $20 ISBN 978-0-13-480554-2
(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 ISBN 978-0-13-480555-9
Instructor $20 ISBN 978-0-13-480556-6
(Module ID 26409-17) Covers heat tracing systems along with their applications and installation requirements.

Motor Operation and Maintenance *(10 Hours)*
Trainee $20 ISBN 978-0-13-480557-3
Instructor $20 ISBN 978-0-13-480558-0
(Module ID 26410-17) Covers motor cleaning, testing, and preventive maintenance. Also describes basic troubleshooting procedures.

Medium-Voltage Terminations/Splices *(10 Hours)*
Trainee $20 ISBN 978-0-13-480561-0
Instructor $20 ISBN 978-0-13-480560-3
(Module ID 26411-17) Offers an overview of the *NEC*® and cable manufacturers' requirements for medium-voltage terminations and splices.

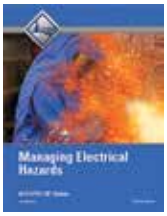
Special Locations *(20 Hours)*
Trainee $20 ISBN 978-0-13-480562-7
Instructor $20 ISBN 978-0-13-480563-4
(Module ID 26412-17) Describes *NEC*® requirements for selecting and installing equipment, enclosures, and devices in special locations including places of assembly, theaters, carnivals, agricultural buildings, marinas, temporary installations, wired partitions, and swimming pools.

Fundamentals of Crew Leadership *(20 Hours)*
(Module ID 46101-11; see p. 69)
Trainee $43 ISBN 978-0-13-293711-5
Instructor $43 ISBN 978-0-13-293726-9

Ordering information for *Electrical Level 4*, Eighth Edition:

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-382315-8
Instructor's Guide: $97	978-0-13-382333-2
NCCERconnect Access Card: $97	978-0-13-415702-3
NCCERconnect + Trainee Guide: $122	978-0-13-427454-6

Managing Electrical Hazards



12.5 Hours
Updated: 2015, Third Edition
Module ID 26501-15

PAPERBACK	ISBN
Trainee Guide: $25	978-0-13-416312-3
Instructor's Guide: $25	978-0-13-413115-3

- A copy of *NFPA 70E*®, *Standard for Electrical Safety in the Workplace*, 2015 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.

Advanced Electrical Topics

Much of the technology in emerging fields—such as wireless, integrated, and voice and data systems—has evolved greatly since the publication of Advanced Electrical Topics Volumes One and Two. Because of this, NCCER and Pearson suggest that those teaching a five-year electrical apprenticeship program use the following compilation of modules drawn from EST and Instrumentation.

BINDER
Trainee Guide: $105 ISBN 978-0-13-606502-9
Instructor's Guide: $105 ISBN 978-0-13-606503-6

Cable Selection	33208-11
Wire and Cable Terminations	33209-11
CCTV Systems	33410-12
Access Control Systems	33411-12
Buses and Networks	33301-11
Fiber Optics	33302-11
Programmable Logic Controllers	12406-03
Broadband Systems	33403-12
Distributed Control Systems	12407-03
Intrusion Detection Systems	33407-12
Audio Systems	33401-12
Overview of Nurse Call and Signaling Systems	33409-12

Electronic Systems Technician

L1 ELECTRONIC SYSTEMS TECHNICIAN

LEVEL 1

Curriculum Notes

- 160 Hours (Includes 72.5 hours of *Core Curriculum*, which is a prerequisite for Level 1 completion and must be purchased separately. See p. 11 for ordering information.)

- Revised: 2010, Third Edition
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $67	978-0-13-213709-6
Instructor's Guide: $67	978-0-13-213710-2
NCCERconnect Access Card: $67	978-0-13-424371-9
NCCERconnect + Trainee Guide: $92	978-0-13-427459-1

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 the Trade *(2.5 Hours)*
Trainee $20 ISBN 978-0-13-213747-8
Instructor $20 ISBN 978-0-13-213756-0
(Module ID 33101-10) Provides an overview of the alarm, telecommunications, and entertainment electronics industries. Introduces the elements of professional conduct and trainees' responsibilities to themselves and their employers, customers, and fellow workers.

Wood and Masonry Construction Methods
(12.5 Hours)

Trainee $20 **ISBN 978-0-13-213748-5**
Instructor $20 **ISBN 978-0-13-213757-7**

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

Concrete and Steel Construction Methods
(12.5 Hours)

Trainee $20 **ISBN 978-0-13-213749-2**
Instructor $20 **ISBN 978-0-13-213758-4**

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

Pathways and Spaces *(12.5 Hours)*

Trainee $20 **ISBN 978-0-13-213750-8**
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)*

Trainee $20 **ISBN 978-0-13-213751-5**
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)*

Trainee $20 **ISBN 978-0-13-213753-9**
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)*

Trainee $20 **ISBN 978-0-13-213754-6**
Instructor $20 **ISBN 978-0-13-213728-7**

(Module ID 33107-10) Provides a road map for using the *NEC®* by introducing the layout and the types of information found within the code book. Allows trainees to practice finding information using an easy-to-follow procedure.

Low-Voltage Cabling *(20 Hours)*

Trainee $20 **ISBN 978-0-13-213755-3**
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.

L2 ELECTRONIC SYSTEMS TECHNICIAN

LEVEL 2

Curriculum Notes

- 145 Hours
- Revised: 2011, Third Edition
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

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**
NCCERconnect + Trainee Guide: $122	**978-0-13-427761-5**

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.

DC Circuits *(15 Hours)*

Trainee $20 **ISBN 978-0-13-266153-9**
Instructor $20 **ISBN 978-0-13-266165-2**

(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)*

Trainee $20 **ISBN 978-0-13-266154-6**
Instructor $20 **ISBN 978-0-13-266166-9**

(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)*

Trainee $20 **ISBN 978-0-13-276963-1**
Instructor $20 **ISBN 978-0-13-266167-6**

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

Semiconductors and Integrated Circuits
(10 Hours)

Trainee $20 **ISBN 978-0-13-266157-7**
Instructor $20 **ISBN 978-0-13-266168-3**

(Module ID 33204-10) Introduces the principles of electronics and semiconductor theory, components, and applications.

Test Equipment *(10 Hours)*

Trainee $20 **ISBN 978-0-13-266158-4**
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)*

Trainee $20 **ISBN 978-0-13-266159-1**
Instructor $20 **ISBN 978-0-13-266170-6**

(Module ID 33206-10) Describes electrical prints, drawings, and symbols and the types of information that can be found on schematics, one-line drawings, and wiring diagrams.

Introduction to Codes and Standards *(10 Hours)*

Trainee $20 **ISBN 978-0-13-266160-7**
Instructor $20 **ISBN 978-0-13-266171-3**

(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®*.

Cable Selection *(10 Hours)*

Trainee $20 **ISBN 978-0-13-266161-4**
Instructor $20 **ISBN 978-0-13-266173-7**

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

Wire and Cable Terminations *(25 Hours)*

Trainee $20 **ISBN 978-0-13-266162-1**
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)*

Trainee $20 **ISBN 978-0-13-266163-8**
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
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

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**
NCCERconnect + Trainee Guide: $122	**978-0-13-427859-9**

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.

Buses and Networks *(25 Hours)*

Trainee $20 **ISBN 978-0-13-266375-5**
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)*

Trainee $20 **ISBN 978-0-13-266376-2**
Instructor $20 **ISBN 978-0-13-266384-7**
(Module ID 33302-11) Introduces the types of equipment and methods used in fiber-optic cable installation.

Wireless Communication *(10 Hours)*

Trainee $20 **ISBN 978-0-13-266377-9**
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)*

Trainee $20 **ISBN 978-0-13-266378-6**
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; see p. 69)

Trainee $43 **ISBN 978-0-13-266379-3**
Instructor $43 **ISBN 978-0-13-266387-8**

Rack Assembly *(17.5 Hours)*

Trainee $20 **ISBN 978-0-13-266380-9**
Instructor $20 **ISBN 978-0-13-266389-2**
(Module ID 33305-11) Describes rack systems and best practices for assembling electronic system enclosures, including power sequencing, grounding, weight distribution, and heat dissipation. Explains electrical power distribution and load calculations for equipment housed within racks.

System Commissioning and User Training *(20 Hours)*

Trainee $20 **ISBN 978-0-13-266381-6**
Instructor $20 **ISBN 978-0-13-266390-8**
(Module ID 33306-11) Covers the final testing and closeout procedures and how to build these activities into projects. Describes customer satisfaction levels and expectations and how to meet them during the cut-over phase of any project. Focuses on industry best practices and user-required training.

Maintenance and Repair *(20 Hours)*

Trainee $20 **ISBN 978-0-13-266382-3**
Instructor $20 **ISBN 978-0-13-266391-5**
(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.

L4 ELECTRONIC SYSTEMS TECHNICIAN

LEVEL 4

Curriculum Notes

- **325 Total Hours (175 Audio, Video, Voice & Data Training Path and 175 Life Safety & Security Training Path)**
- **Revised: 2012, Third Edition**
- **Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.**
- **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	ISBN
Trainee Guide: $97	978-0-13-257821-9
Instructor's Guide: $97	978-0-13-266256-7
NCCERconnect Access Card: $97	978-0-13-443625-8
NCCERconnect + Trainee Guide: $122	978-0-13-453975-1

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.

Audio Systems *(30 Hours)*

Trainee $20 **ISBN 978-0-13-292256-2**
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)*

Trainee $20 **ISBN 978-0-13-292257-9**
Instructor $20 **ISBN 978-0-13-292269-2**
(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)*

Trainee $20 **ISBN 978-0-13-292258-6**
Instructor $20 **ISBN 978-0-13-292270-8**
(Module ID 33403-12) Describes the major elements of head-end design for specialized television systems, including CATV, SMATV, and MATV systems. Explains the function and operation of receivers, modulators, amplification, and distribution devices. Discusses proper signal levels, cable attenuation, insertion loss, and acceptable carrier-to-noise levels. Covers common test equipment and troubleshooting procedures.

Media Management Systems *(20 Hours)*

Trainee $20 **ISBN 978-0-13-292259-3**
Instructor $20 **ISBN 978-0-13-292271-5**
(Module ID 33404-12) Explains the basic principles behind shared media resources and their access via a computer network or hardwired application. Describes media types for both analog and digital platforms. Explores cabling options including fiber-optic interfaces.

Telecommunications Systems *(20 Hours)*

Trainee $20 **ISBN 978-0-13-292260-9**
Instructor $20 **ISBN 978-0-13-292272-2**
(Module ID 33405-12) Describes the history and current use of basic subscriber systems. Also covers PBX systems used in business applications and Central office services used to interface to the public switched telephone network (PSTN).

Residential and Commercial Building Networks *(25 Hours)*

Trainee $20 **ISBN 978-0-13-292261-6**
Instructor $20 **ISBN 978-0-13-292273-9**
(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)*

Trainee $20 **ISBN 978-0-13-292262-3**
Instructor $20 **ISBN 978-0-13-292274-6**
(Module ID 33407-12) Describes devices such as sensors, notification, control panels, and programming used in intrusion detection security systems. Covers system design and installation guidelines, wiring, testing, and troubleshooting. Emphasizes codes and standards.

Fire Alarm Systems *(40 Hours)*

Trainee $20 **ISBN 978-0-13-292263-0**
Instructor $20 **ISBN 978-0-13-292275-3**
(Module ID 33408-12) Covers the basics of fire alarm systems, including devices, circuits, system design and installation guidelines, power requirements, control panel programming, testing, and troubleshooting. Explores integration of fire alarms with other systems. Examines both residential and commercial fire alarm applications, emphasizing *NEC*® requirements.

Overview of Nurse Call and Signaling Systems *(15 Hours)*

Trainee $20 **ISBN 978-0-13-292264-7**
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)*

Trainee $20 **ISBN 978-0-13-292265-4**
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)*

Trainee $20 **ISBN 978-0-13-292266-1**
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.

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. 11 for ordering information.)
- Revised: 2012, Third Edition
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $67	978-0-13-292142-8
Instructor's Guide: $67	978-0-13-292166-4
NCCERconnect Access Card: $67	978-0-13-448249-1
NCCERconnect + Trainee Guide: $92	978-0-13-453974-4

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.

Orientation to the Trade *(5 Hours)*
Trainee $20 ISBN 978-0-13-292305-7
Instructor $20 ISBN 978-0-13-292312-5
(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 ISBN 978-0-13-292306-4
Instructor $20 ISBN 978-0-13-292313-2
(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 ISBN 978-0-13-292307-1
Instructor $20 ISBN 978-0-13-292314-9
(Module ID 22103-12) Introduces the eleven 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 ISBN 978-0-13-292308-8
Instructor $20 ISBN 978-0-13-292315-6
(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 ISBN 978-0-13-292309-5
Instructor $20 ISBN 978-0-13-292316-3
(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 ISBN 978-0-13-292310-1
Instructor $20 ISBN 978-0-13-292317-0
(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 ISBN 978-0-13-292311-8
Instructor $20 ISBN 978-0-13-292319-4
(Module ID 22106-12) Introduces the concept of preparing graded surfaces using heavy equipment. Covers identification of construction stakes and interpretation of marks on each type of stake. Describes the process for grading slopes.

L2 HEAVY EQUIPMENT OPERATIONS

LEVEL 2

Curriculum Notes

- 167.5 Hours
- Revised: 2013, Third Edition
- New printed Instructor's Package includes lesson plans and instructor's copy of Trainee Guide with an access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-340251-3
Instructor's Package: $97	978-0-13-416625-4
NCCERconnect Access Card: $97	978-0-13-448252-1
NCCERconnect + Trainee Guide: $122	978-0-13-453963-8

MODULES

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

Rough Terrain Forklifts *(22.5 Hours)*
Trainee $20 ISBN 978-0-13-340322-0
Instructor $20 ISBN 978-0-13-340333-6
(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 ISBN 978-0-13-340319-0
Instructor $20 ISBN 978-0-13-340329-9
(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.

Excavation Math *(17.5 Hours)*
Trainee $20 ISBN 978-0-13-340323-7
Instructor $20 ISBN 978-0-13-340334-3
(Module ID 22207-13) Covers basic math skills required for site excavation work. Includes methods and practice in calculating the areas and volumes of various geometric shapes, as well as formulas and methods used to calculate cut and fill requirements on a job.

Interpreting Civil Drawings *(20 Hours)*
Trainee $20 ISBN 978-0-13-340325-1
Instructor $20 ISBN 978-0-13-340335-0
(Module ID 22209-13) Explains how to read site plans to calculate cut and fill requirements. Provides instruction and practice in interpreting both roadway and construction site drawings used for excavation and grading work.

Site Work *(20 Hours)*
Trainee $20 ISBN 978-0-13-340326-8
Instructor $20 ISBN 978-0-13-340336-7
(Module ID 22210-13) Expands on information covered in Level 1 in relation to setting and interpreting grade stakes. Also provides information and instructions on controlling surface water and ground water on a job site, as well as the layout of foundations and laying of pipe.

Soils *(10 Hours)*
Trainee $20 ISBN 978-0-13-340328-2
Instructor $20 ISBN 978-0-13-340338-1
(Module ID 22308-13) Describes soil classification systems and explains how shrink and swell factors affect equipment selection. Discusses how soil conditions affect equipment performance and explains techniques for working with various types of soils.

Skid Steers *(22.5 Hours)*
Trainee $20 ISBN 978-0-13-340327-5
Instructor $20 ISBN 978-0-13-340337-4
(Module ID 22212-13) Describes the many uses of skid steers and the attachments available for these machines. Covers safety practices, as well as inspection, startup, shutdown, and operation of skid steers.

Loaders *(17.5 Hours)*
Trainee $20 ISBN 978-0-13-340321-3
Instructor $20 ISBN 978-0-13-340331-2
(Module ID 22205-13) Covers the uses of wheel and track loaders, as well as operator maintenance, loader safety, and operating procedures. Includes procedures for using loaders in excavation, grading, and demolition work.

Scrapers *(17.5 Hours)*
Trainee $20 ISBN 978-0-13-340320-6
Instructor $20 ISBN 978-0-13-340330-5
(Module ID 22204-13) Describes the types of scrapers used in site preparation, as well as the safe practices associated with the operation of scrapers. Covers operator inspection and maintenance requirements, along with startup, shutdown, and operating techniques.

L3 HEAVY EQUIPMENT OPERATIONS

LEVEL 3

Curriculum Notes

- 215 Hours
- Revised: 2014, Third Edition
- New printed Instructor's Package includes lesson plans and instructor's copy of Trainee Guide with an access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-340256-8
Instructor's Package: $97	978-0-13-416626-1
NCCERconnect Access Card: $97	978-0-13-448244-6
NCCERconnect + Trainee Guide: $122	978-0-13-453962-1

MODULES

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

Finishing and Grading *(25 Hours)*
Trainee $20 ISBN 978-0-13-377955-4
Instructor $20 ISBN 978-0-13-377978-3
(Module ID 22307-14) Provides training on common types of equipment and instruments used for finish grading; materials and methods used to stabilize soils and control soil erosion; and finishing and grading methods used for various applications.

Compaction Equipment *(25 Hours)*
Trainee $20 ISBN 978-0-13-377956-1
Instructor $20 ISBN 978-0-13-377980-6
(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 ISBN 978-0-13-377957-8
Instructor $20 ISBN 978-0-13-377981-3
(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 ISBN 978-0-13-377958-5
Instructor $20 ISBN 978-0-13-377982-0
(Module ID 22310-14) Identifies and describes the common types, uses, and components of off-road dump trucks. Presents safety guidelines, prestart inspection procedures, and preventive maintenance requirements. Covers basic startup, driving maneuvers, loading, and dumping procedures for off-road dump trucks.

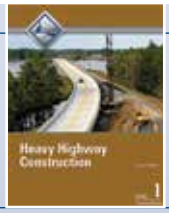
Dozers *(30 Hours)*
Trainee $20 ISBN 978-0-13-382759-0
Instructor $20 ISBN 978-0-13-377977-6
(Module ID 22302-14) Identifies and describes the common uses, types, and components of dozers. Presents safety guidelines, prestart inspection procedures, and preventive maintenance requirements. Describes basic startup and operation, and covers common work activities associated with dozers.

Excavators *(35 Hours)*
Trainee $20 ISBN 978-0-13-377959-2
Instructor $20 ISBN 978-0-13-377960-8
(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 ISBN 978-0-13-377962-2
Instructor $20 ISBN 978-0-13-377976-9
(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.

Heavy Highway Construction

L1 HEAVY HIGHWAY CONSTRUCTION



LEVEL 1

REVISED!

Curriculum Notes

- 150 Hours (Includes 80 hours of *Core Curriculum* which is a prerequisite for completion and must be purchased separately. See p. 11 for ordering information.)
- To Be Revised: 2017, Second Edition
- New printed Instructor's Package includes lesson plans and instructor's copy of Trainee Guide with an access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $67	978-0-13-448247-7
Instructor's Package: $67	978-0-13-454304-8

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.

Orientation to the Trade *(7.5 Hours)*
Trainee $20 ISBN 978-0-13-448575-1
Instructor $20 ISBN 978-0-13-448574-4
(Module ID 36101-17) Provides an overview of the work performed by craft-workers involved in the construction of highways and bridges, focusing on the three distinct branches of the trade: grading, paving, and structures and their processes. Covers opportunities in the trades, and includes a description of NCCER training programs and apprenticeships.

Safety *(5 Hours)*
Trainee $20 ISBN 978-0-13-448577-5
Instructor $20 ISBN 978-0-13-448576-8
(Module ID 36110-17) Expands on the safety coverage in the *Core Curriculum*, focusing on issues specific to highway and bridge work such as traffic safety, fall protection, working above or around water, confined spaces, and environmental hazards.

Identification of Equipment Used in Heavy Highway Construction *(10 Hours)*
Trainee $20 ISBN 978-0-13-448579-9
Instructor $20 ISBN 978-0-13-448578-2
(Module ID 36111-17) Identifies the various types of heavy equipment used on highway and bridge job sites, including excavators, bulldozers, cranes, and backhoes. Also covers utility equipment such as generators, air compressors, and compacting equipment.

Excavation Math *(17.5 Hours)*
(Module ID 22207-13; *from Heavy Equipment Operations Level 2*)
Trainee $20 ISBN 978-0-13-340323-7
Instructor $20 ISBN 978-0-13-340334-3

Reinforcing Concrete *(15 Hours)*
(Module ID 27304-14; from *Carpentry Level 3*)
Trainee $20 ISBN 978-0-13-378679-8
Instructor $20 ISBN 978-0-13-378690-3

Working with Concrete *(15 Hours)*
Trainee $20 ISBN 978-0-13-448582-9
Instructor $20 ISBN 978-0-13-448581-2
(Module ID 36112-17) Covers properties and characteristics of concrete and the materials used in making concrete, along with testing methods. Also includes information and instructions for safely handling, placing, and finishing concrete.

Ordering information for *Highway/Heavy Construction*, First Edition:

PAPERBACK	ISBN
Trainee Guide: $67	978-0-13-061611-1
Instructor's Guide: $140	978-0-13-061612-8

L2 HEAVY HIGHWAY CONSTRUCTION

LEVEL 2

Curriculum Notes

NEW!

- 145 Hours
- To Be Published: 2017
- New printed Instructor's Package includes lesson plans and instructor's copy of Trainee Guide with an access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.
- For more information, visit www.nccer.org/book-updates.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-448246-0
Instructor's Package: $97	978-0-13-454303-1

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 Earthmoving *(12.5 Hours)*
(Module ID 22201-12; from *Heavy Equipment Operations Level 2*)
Trainee $20 ISBN 978-0-13-292310-1
Instructor $20 ISBN 978-0-13-292317-0

Site Work *(20 Hours)*
(Module ID 22210-13; from *Heavy Equipment Operations Level 2*)
Trainee $20 ISBN 978-0-13-340326-8
Instructor $20 ISBN 978-0-13-340336-7

Interpreting Civil Drawings *(20 Hours)*
(Module ID 22209-13; from *Heavy Equipment Operations Level 2*)
Trainee $20 ISBN 978-0-13-340325-1
Instructor $20 ISBN 978-0-13-340335-0

Work-Zone Safety *(5 hours)*
(Module ID 75104-13; from *Field Safety*)
Trainee $20 ISBN 978-0-13-340361-9
Instructor $20 ISBN 978-0-13-340370-1

Plant Operations *(7.5 Hours)*
Trainee $20 ISBN 978-0-13-448584-3
Instructor $20 ISBN 978-0-13-448583-6
(Module ID 36107-17) Describes the materials used in making concrete and asphalt, as well as the methods by which these materials are obtained. Covers the methods and facilities used to produce concrete and asphalt.

Paving *(7.5 Hours)*
Trainee $20 ISBN 978-0-13-448586-7
Instructor $20 ISBN 978-0-13-448585-0
(Module ID 36108-17) Explains the equipment and methods used in performing hot-mix asphalt and concrete paving. Discusses concrete paving equipment, such as slipform pavers and texture and curing machines.

Crane Safety *(15 Hours)*
(Module ID 21104-04; from *Mobile Crane Operations Level 1*)
Trainee $20 ISBN 978-0-13-160068-3
Instructor $20 ISBN 978-0-13-160074-4

Rigging Equipment *(10 Hours)*
(Module ID 38101-11; from *Basic Rigger*)
Trainee $20 ISBN 978-0-13-266176-8
Instructor $20 ISBN 978-0-13-266178-2

Rigging Practices *(15 Hours)*
(Module ID 38102-11; from *Basic Rigger*)
Trainee $20 ISBN 978-0-13-266177-5
Instructor $20 ISBN 978-0-13-266179-9

Bridge Construction *(20 Hours)*
Trainee $20 ISBN 978-0-13-448588-1
Instructor $20 ISBN 978-0-13-448587-4
(Module ID 36201-17) Describes the various types and the major components of bridges. Includes basic surveying equipment and principles, and describes the structure and content of bridge plans.

Deep Foundations *(10 Hours)*
Trainee $20 ISBN 978-0-13-448591-1
Instructor $20 ISBN 978-0-13-448590-4
(Module ID 36202-17) Describes the various types of foundations used in bridge construction and how they are installed. Covers, piles and pile installation, footings, cofferdams, pile driving equipment, and the environmental issues associated with pile driving.

Bridge Formwork *(22.5 Hours)*
Trainee $20 ISBN 978-0-13-448593-5
Instructor $20 ISBN 978-0-13-448592-8
(Module ID 36203-17) Identifies the basic types of concrete forms used in bridge building and describes how those forms are used. Explains how to assemble, set, maintain, and store forms.

Hydroblasting

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

PAPERBACK	ISBN
Trainee Guide: $25	978-0-13-294870-8
Instructor's Guide: $25	978-0-13-294915-6

- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

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

HVAC

L1 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. 11 for ordering information.)
- Revised: 2013, Fourth Edition
- NATE-Recognized Training Provider
- New printed Instructor's Package includes lesson plans and instructor's copy of Trainee Guide with an access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $67	978-0-13-340253-7
Instructor's Package: $67	978-0-13-416627-8
NCCERconnect Access Card: $67	978-0-13-415708-5
NCCERconnect + Trainee Guide: $92	978-0-13-427461-4

MODULES

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

Introduction to HVAC *(7.5 Hours)*
Trainee $20 ISBN 978-0-13-340339-8
Instructor $20 ISBN 978-0-13-340349-7
(Module ID 03101-13) Covers the basic principles of heating, ventilating, and air conditioning, career opportunities in HVAC, and how apprenticeship programs are constructed. Basic safety principles, as well as trade licensure and EPA guidelines, are also introduced.

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.

Trade Mathematics *(10 Hours)*

Trainee $20 **ISBN 978-0-13-340341-1**
Instructor $20 **ISBN 978-0-13-340350-3**

(Module ID 03102-13) Explains how to solve HVAC/R trade-related problems involving the measurement of lines, area, volume, weights, angles, pressure, vacuum, and temperature. Also includes a review of scientific notation, powers, roots, and basic algebra and geometry.

Basic Electricity *(12.5 Hours)*

Trainee $20 **ISBN 978-0-13-340342-8**
Instructor $20 **ISBN 978-0-13-340351-0**

(Module ID 03106-13) Introduces the concept of power generation and distribution, common electrical components, AC and DC circuits, and electrical safety as it relates to the HVAC field. Introduces reading and interpreting wiring diagrams.

Introduction to Heating *(15 Hours)*

Trainee $20 **ISBN 978-0-13-340343-5**
Instructor $20 **ISBN 978-0-13-340352-7**

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

Introduction to Cooling *(30 Hours)*

Trainee $20 **ISBN 978-0-13-340344-2**
Instructor $20 **ISBN 978-0-13-340353-4**

(Module ID 03107-13) Explains the fundamental operating concepts of the refrigeration cycle and identifies both primary and secondary components found in typical HVAC/R systems. Also introduces common refrigerants. Describes the principles of heat transfer and the essential pressure-temperature relationships of refrigerants. Introduces basic control concepts for simple systems.

Introduction to Air Distribution Systems *(15 Hours)*

Trainee $20 **ISBN 978-0-13-340345-9**
Instructor $20 **ISBN 978-0-13-340354-1**

(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 to create air distribution systems. Introduces basic system design principles for both hot and cold climates.

Basic Copper and Plastic Piping Practices *(10 Hours)*

Trainee $20 **ISBN 978-0-13-340346-6**
Instructor $20 **ISBN 978-0-13-340355-8**

(Module ID 03103-13) Explains how to identify types of copper tubing and fittings used in the HVAC/R industry and how they are mechanically joined. Also presents the identification and application of various types of plastic piping, along with their common assembly and installation practices.

Soldering and Brazing *(10 Hours)*

Trainee $20 **ISBN 978-0-13-340347-3**
Instructor $20 **ISBN 978-0-13-340356-5**

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

Basic Carbon Steel Piping Practices *(10 Hours)*

Trainee $20 **ISBN 978-0-13-340348-0**
Instructor $20 **ISBN 978-0-13-340358-9**

(Module ID 03105-13) Explains how to identify various carbon steel piping materials and fittings. Covers the joining and installation of threaded and grooved carbon steel piping systems, including detailed descriptions of threading and grooving techniques.

L2 HVAC

LEVEL 2

Curriculum Notes

- 170 Hours
- Revised: 2013, Fourth Edition
- NATE-Recognized Training Provider
- New printed Instructor's Package includes lesson plans and instructor's copy of Trainee Guide with an access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-340427-2
Instructor's Package: $97	978-0-13-415782-5
NCCERconnect Access Card: $97	978-0-13-415714-6
NCCERconnect + Trainee Guide: $122	978-0-13-427453-9

MODULES

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

Alternating Current *(10 Hours)*

Trainee $20 **ISBN 978-0-13-377994-3**
Instructor $20 **ISBN 978-0-13-378009-3**

(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 **ISBN 978-0-13-377996-7**
Instructor $20 **ISBN 978-0-13-378070-3**

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

Refrigerants and Oils *(12.5 Hours)*

Trainee $20 **ISBN 978-0-13-377997-4**
Instructor $20 **ISBN 978-0-13-378010-9**

(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)*

Trainee $20 **ISBN 978-0-13-377998-1**
Instructor $20 **ISBN 978-0-13-378011-6**

(Module ID 03205-13) Covers refrigerant handling and equipment servicing procedures for HVAC systems in an environmentally safe manner.

Metering Devices *(12.5 Hours)*

Trainee $20 **ISBN 978-0-13-382754-5**
Instructor $20 **ISBN 978-0-13-378012-3**

(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)*

Trainee $20 **ISBN 978-0-13-378001-7**
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**
Instructor $20 **ISBN 978-0-13-378014-7**

(Module ID 03215-13) Covers information related to maintenance-oriented materials, as well as guidelines for the inspection and periodic maintenance of various systems and accessories. Also covers the application of gaskets and seals, as well as the adjustment of different types of belt drives. Includes information on inspection and maintenance requirements for selected equipment.

Chimneys, Vents, and Flues *(5 Hours)*

Trainee $20 **ISBN 978-0-13-378003-1**
Instructor $20 **ISBN 978-0-13-382270-0**

(Module ID 03202-13) 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)*

Trainee $20 **ISBN 978-0-13-378004-8**
Instructor $20 **ISBN 978-0-13-382271-7**

(Module ID 03213-13) 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)*

Trainee $20 **ISBN 978-0-13-378005-5**
Instructor $20 **ISBN 978-0-13-382272-4**

(Module ID 03214-13) 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)*

Trainee $20 **ISBN 978-0-13-378006-2**
Instructor $20 **ISBN 978-0-13-382273-1**

(Module ID 03201-13) Describes the systems, equipment, and operating sequences commercial airside system configurations such as constant volume single-zone and multi-zone, VVT, VAV, and dual-duct VAV.

Air Quality Equipment *(5 Hours)*

Trainee $20 **ISBN 978-0-13-378007-9**
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)*

Trainee $20 **ISBN 978-0-13-378008-6**
Instructor $20 **ISBN 978-0-13-378108-3**

(Module ID 03203-13) Introduces hot water heating systems, focusing on safe operation of the low-pressure boilers and piping systems in residential applications.

L3 HVAC

LEVEL 3

Curriculum Notes

- 157.5 Hours
- Revised: 2013, Fourth Edition
- NATE-Recognized Training Provider
- New printed Instructor's Package includes lesson plans and instructor's copy of Trainee Guide with an access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-375083-6
Instructor's Package: $97	978-0-13-430598-1
NCCERconnect Access Card: $97	978-0-13-414605-8
NCCERconnect + Trainee Guide: $122	978-0-13-427460-7

MODULES

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

Fasteners, Hardware, and Wiring Terminations *(10 Hours)*

Trainee $20 **ISBN 978-0-13-377999-8**
Instructor $20 **ISBN 978-0-13-378120-5**

(Module ID 03313-13) Covers a variety of fasteners, hardware, and wiring terminations used in HVAC systems including the installation of these components.

Control Circuit and Motor Troubleshooting *(30 Hours)*

Trainee $20 **ISBN 978-0-13-382407-0**
Instructor $20 **ISBN 978-0-13-378121-2**

(Module ID 03314-13) Provides information and skills to troubleshoot control circuits and electric motors found in heating and cooling equipment.

Troubleshooting Cooling *(20 Hours)*

Trainee $20 **ISBN 978-0-13-382406-3**
Instructor $20 **ISBN 978-0-13-378122-9**

(Module ID 03210-13) Provides guidance related to troubleshooting cooling systems.

Troubleshooting Heat Pumps *(12.5 Hours)*

Trainee $20 **ISBN 978-0-13-378119-9**
Instructor $20 **ISBN 978-0-13-378132-8**

(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)*

Trainee $20 **ISBN 978-0-13-382405-6**
Instructor $20 **ISBN 978-0-13-378133-5**

(Module ID 03209-13) Covers information and skills needed to troubleshoot gas-fired furnaces and boilers.

Troubleshooting Oil Heating *(12.5 Hours)*

Trainee $20 **ISBN 978-0-13-382404-9**
Instructor $20 **ISBN 978-0-13-378135-9**

(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 Accessories *(7.5 Hours)*

Trainee $20 **ISBN 978-0-13-382438-4**
Instructor $20 **ISBN 978-0-13-378136-6**

(Module ID 03312-13) Delivers information and skills needed to troubleshoot various air treatment accessories used with heating and cooling equipment.

Zoning, Ductless, and Variable Refrigerant Flow Systems *(12.5 Hours)*

Trainee $20 **ISBN 978-0-13-378109-0**
Instructor $20 **ISBN 978-0-13-378137-3**

(Module ID 03315-13) Introduces the information and skills needed to troubleshoot and repair zoned, ductless, and variable refrigerant flow systems.

Commercial Hydronic Systems *(10 Hours)*

Trainee $20 **ISBN 978-0-13-378111-3**
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**
Instructor $20 **ISBN 978-0-13-378139-7**

(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)*

Trainee $20 **ISBN 978-0-13-378116-8**
Instructor $20 **ISBN 978-0-13-378140-3**

(Module ID 03304-13) Covers the applications, principles, and troubleshooting of retail refrigeration systems.

Customer Relations *(5 Hours)*

Trainee $20 **ISBN 978-0-13-378117-5**
Instructor $20 **ISBN 978-0-13-378142-7**

(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.

L4 HVAC

LEVEL 4

Curriculum Notes

- 155 Hours
- Revised: 2013, Fourth Edition
- NATE-Recognized Training Provider
- New printed Instructor's Package includes lesson plans and instructor's copy of Trainee Guide with an access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-375719-4
Instructor's Package: $97	978-0-13-416628-5
NCCERconnect Access Card: $97	978-0-13-414607-2
NCCERconnect + Trainee Guide: $122	978-0-13-427455-3

MODULES

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

Water Treatment *(10 Hours)*

Trainee $20 **ISBN 978-0-13-378143-4**
Instructor $20 **ISBN 978-0-13-378164-9**

(Module ID 03308-13) Explains water problems encountered in heating and cooling systems and identifies water treatment methods and equipment. Covers basic water testing procedures and chemistry.

Indoor Air Quality *(12.5 Hours)*

Trainee $20 **ISBN 978-0-13-378144-1**
Instructor $20 **ISBN 978-0-13-378165-6**

(Module ID 03403-13) Defines the issues associated with indoor air quality and its effect on the health and comfort of building occupants. Provides guidelines for performing an IAQ survey and covers the equipment and methods used to monitor and control indoor air quality.

Energy Conservation Equipment *(7.5 Hours)*

Trainee $20 **ISBN 978-0-13-378173-1**
Instructor $20 **ISBN 978-0-13-378166-3**

(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)*

Trainee $20 **ISBN 978-0-13-378174-8**
Instructor $20 **ISBN 978-0-13-378168-7**

(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)*

Trainee $20 **ISBN 978-0-13-378157-1**
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)*

Trainee $20 **ISBN 978-0-13-378158-8**
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)*

Trainee $20 **ISBN 978-0-13-378160-1**
Instructor $20 **ISBN 978-0-13-378171-7**

(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)*

Trainee $20 **ISBN 978-0-13-378161-8**
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)*

Trainee $20 **ISBN 978-0-13-378162-5**
Instructor $20 **ISBN 978-0-13-378176-2**

(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 defrost systems are covered in detail.

Alternative and Specialized Heating and Cooling Systems *(10 Hours)*

Trainee $20 **ISBN 978-0-13-378163-2**
Instructor $20 **ISBN 978-0-13-378177-9**

(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; see p. 69)

Trainee $43 **ISBN 978-0-13-292245-6**
Instructor $43 **ISBN 978-0-13-292255-5**

GREEN TOPICS IN HVAC

GBCI CMP

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 **ISBN 978-0-13-611998-2**
Instructor's Guide: $65 **ISBN 978-0-13-611999-9**

MODULES

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

Industrial Coating and Lining Application Specialist

L1 INDUSTRIAL COATING AND LINING APPLICATION SPECIALIST

LEVEL 1

Curriculum Notes

- 150 Hours
- Published: 2009
- *Core Curriculum* is *not* a prerequisite for *Industrial Coatings and Lining Application Specialist*.
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK **ISBN**
Trainee Guide: $103 **978-0-13-604508-3**
Instructor's Guide: $103 **978-0-13-604509-0**

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 Safety *(15 Hours)*

(Module ID 00101-04; from *Core Curriculum*)

Trainee $20 **ISBN 978-0-13-160004-1**
Instructor $20 **ISBN 978-0-13-160013-3**

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

Basic Rigging *(20 Hours)*

(Module ID 00106-04; from Core Curriculum)

Trainee $20 **ISBN 978-0-13-160009-6**
Instructor $20 **ISBN 978-0-13-160018-8**

Introduction to the Trade *(5 Hours)*

Trainee $20 **ISBN 978-0-13-604816-9**
Instructor $20 **ISBN 978-0-13-604822-0**

(Module ID 69101-09) Provides an introduction to the coatings industry, including career opportunities and an introduction to coatings safety.

Surface Preparation *(100 Hours)*

Trainee $20 **ISBN 978-0-13-604818-3**
Instructor $20 **ISBN 978-0-13-604824-4**

(Module ID 69102-09) Explains reasons for surface preparation, standards of preparation, and methods of preparing surfaces. Describes the use of basic equipment as well as cleaning procedures.

Industrial Coatings *(15 Hours)*

Trainee $20 **ISBN 978-0-13-604820-6**
Instructor $20 **ISBN 978-0-13-604825-1**

(Module ID 69103-09) Describes types of coatings, their advantages and disadvantages, applications, and specific preparations required.

Coating Application *(105 Hours)*

Trainee $20 **ISBN 978-0-13-604821-3**
Instructor $20 **ISBN 978-0-13-604826-8**

(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 **ISBN 978-0-13-604817-6**
Instructor $20 **ISBN 978-0-13-604823-7**

(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.

L2 INDUSTRIAL COATING AND LINING APPLICATION SPECIALIST

LEVEL 2

Curriculum Notes

- 320 Hours
- Published: 2010
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $103	978-0-13-604510-6
Instructor's Guide: $103	978-0-13-604511-3

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.

Industrial Coating Safety *(30 Hours)*
Trainee $20 ISBN 978-0-13-604827-5
Instructor $20 ISBN 978-0-13-604800-8
(Module ID 69201-10) Describes safety standards and regulations, access control, and personal safety equipment and training requirements. Covers safety decision-making procedures.

Corrosion Protection *(5 Hours)*
Trainee $20 ISBN 978-0-13-604828-2
Instructor $20 ISBN 978-0-13-604801-5
(Module ID 69202-10) Teaches the elements of corrosion in concrete and metals and describes the chemistry of corrosion.

Work Planning and Quality Control *(25 Hours)*
Trainee $20 ISBN 978-0-13-604796-4
Instructor $20 ISBN 978-0-13-604839-8
(Module ID 69203-10) Explains how to follow and execute a work plan. Covers area and ratio calculations and explains how to determine VOC ratios when adding thinners. Explains the effects of pressure, volume, and temperature on surface preparation and application.

Containment *(60 Hours)*
Trainee $20 ISBN 978-0-13-604795-7
Instructor $20 ISBN 978-0-13-604803-9
(Module ID 69204-10) Describes the types of containment appropriate to various coating and surface preparation applications, including standards and verification. Also covers containment erection and repair.

Surface Preparation Two *(80 Hours)*
Trainee $20 ISBN 978-0-13-604797-1
Instructor $20 ISBN 978-0-13-604840-4
(Module ID 69205-10) Explains how to identify the surface condition of common substrates. Provides specific training in surface-preparation equipment. Describes inspection and documentation of test equipment, and processes.

Industrial Coatings Two *(20 Hours)*
Trainee $20 ISBN 978-0-13-604798-8
Instructor $20 ISBN 978-0-13-604841-1
(Module ID 69206-10) Discusses the physical properties of various coatings, including convertible and nonconvertible types. Also covers basic curing mechanisms and methods of film formation.

Coating Applications Two *(100 Hours)*
Trainee $20 ISBN 978-0-13-604799-5
Instructor $20 ISBN 978-0-13-604842-8
(Module ID 69207-10) Covers the setup, maintenance, and disassembly of conventional air spray, airless spray, air-assisted airless spray, and HVLP spraying equipment, including testing and documentation. Also covers overcoating and explains how to use wet and dry film thickness gauges.

Industrial Maintenance Electrical & Instrumentation Technician

L1 INDUSTRIAL MAINTENANCE ELECTRICAL & INSTRUMENTATION TECHNICIAN

LEVEL 1

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. 11 for ordering information.)
- Revised: 2007, Third Edition
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $67	978-0-13-228606-0
Instructor's Guide: $67	978-0-13-228607-7

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 $20 ISBN 978-0-13-614612-4
Instructor $20 ISBN 978-0-13-614625-4
(Module ID 40101-07) Covers the history of the trade, and provides an overview of the industrial maintenance craft. Describes apprenticeship and training programs, as well as career opportunities. Also describes the responsibilities and characteristics of successful workers.

Tools of the Trade *(5 Hours)*
Trainee $20 ISBN 978-0-13-614613-1
Instructor $20 ISBN 978-0-13-614626-1
(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 $20 ISBN 978-0-13-614614-8
Instructor $20 ISBN 978-0-13-614627-8
(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 $20 ISBN 978-0-13-614615-5
Instructor $20 ISBN 978-0-13-614628-5
(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 $20 ISBN 978-0-13-614616-2
Instructor $20 ISBN 978-0-13-614596-7
(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 $20 ISBN 978-0-13-614617-9
Instructor $20 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 $20 ISBN 978-0-13-614618-6
Instructor $20 ISBN 978-0-13-614598-1
(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 $20 ISBN 978-0-13-614619-3
Instructor $20 ISBN 978-0-13-614599-8
(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 $20 **ISBN 978-0-13-614620-9**
Instructor $20 **ISBN 978-0-13-614600-1**
(Module ID 40109-07) Identifies different types of valves and describes their installation, storage, and handling.

Introduction to Test Instruments *(7.5 Hours)*

Trainee $20 **ISBN 978-0-13-614621-6**
Instructor $20 **ISBN 978-0-13-614601-8**
(Module ID 40110-07) Introduces test equipment for industrial maintenance, including tachometers, pyrometers, strobe meters, voltage testers, and automated diagnostic tools.

Material Handling and Hand Rigging *(15 Hours)*

Trainee $20 **ISBN 978-0-13-614622-3**
Instructor $20 **ISBN 978-0-13-614602-5**
(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 $20 **ISBN 978-0-13-614623-0**
Instructor $20 **ISBN 978-0-13-614639-1**
(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 $20 **ISBN 978-0-13-614624-7**
Instructor $20 **ISBN 978-0-13-614640-7**
(Module ID 40113-07) Explains lubrication safety, storage, and classifications. Also explains selecting lubricants, additives, lubrication equipment, and lubricating charts.

L2 INDUSTRIAL MAINTENANCE ELECTRICAL & INSTRUMENTATION TECHNICIAN

LEVEL 2

Curriculum Notes

- 160 Hours
- Revised: 2008, Third Edition
- Instructor's Guide includes access code to download TestGen software, module exams, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-614390-1
Instructor's Guide: $97	978-0-13-614391-8

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.

Industrial Safety for E&I Technicians *(12.5 Hours)*

Trainee $20 **ISBN 978-0-13-604701-8**
Instructor $20 **ISBN 978-0-13-604716-2**
(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 $20 **ISBN 978-0-13-604702-5**
Instructor $20 **ISBN 978-0-13-604717-9**
(Module ID 40202-08) Provides a road map for using the *NEC®*. Introduces the layout and types of information found within the code book. Allows trainees to practice finding information using an easy-to-follow procedure.

Electrical Theory *(15 Hours)*

Trainee $20 **ISBN 978-0-13-604704-9**
Instructor $20 **ISBN 978-0-13-604718-6**
(Module ID 40203-08) Introduces electrical concepts used in Ohm's law as applied to DC series circuits. Includes atomic theory, electromotive force, resistance, and electric power equations. Introduces series, parallel, and series-parallel circuits. Covers resistive circuits, Kirchhoff's voltage and current laws, and circuit analysis.

Alternating Current *(20 Hours)*

Trainee $20 **ISBN 978-0-13-604705-6**
Instructor $20 **ISBN 978-0-13-604719-3**
(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 $20 **ISBN 978-0-13-604706-3**
Instructor $20 **ISBN 978-0-13-604720-9**
(Module ID 40205-08) Focuses on proper selection, inspection, and use of common electrical and instrumentation test equipment, including voltage testers, clamp-on ammeters, ohmmeters, multimeters, phase/motor rotation testers, data recording equipment, field communicators, pressure testers, and dead weight testers. Also covers safety precautions and meter category ratings.

Flow, Pressure, Level, and Temperature *(15 Hours)*

Trainee $20 **ISBN 978-0-13-604707-0**
Instructor $20 **ISBN 978-0-13-604721-6**
(Module ID 40206-08) Presents devices used to measure flow, pressure, level, and temperature, along with their principles of operation.

Process Mathematics *(15 Hours)*

Trainee $20 **ISBN 978-0-13-604708-7**
Instructor $20 **ISBN 978-0-13-604722-3**
(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 **ISBN 978-0-13-604709-4**
Instructor $20 **ISBN 978-0-13-604723-0**
(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 **ISBN 978-0-13-604710-0**
Instructor $20 **ISBN 978-0-13-604724-7**
(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 **ISBN 978-0-13-604711-7**
Instructor $20 **ISBN 978-0-13-604690-5**
(Module ID 40210-08) Presents safe methods for cleaning, purging, blowing down, pressure testing, and leak testing tubing, piping, and hoses used in industrial maintenance.

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

Trainee $20 **ISBN 978-0-13-604713-1**
Instructor $20 **ISBN 978-0-13-604691-2**
(Module ID 40211-08) Introduces instrument symbols, abbreviations, and drawings and documents, including instrument indexes, installation detail drawings, location drawings, and control loops.

Conductors and Cables *(10 Hours)*

Trainee $20 **ISBN 978-0-13-604714-8**
Instructor $20 **ISBN 978-0-13-604692-9**
(Module ID 40212-08) Focuses on the types and applications of conductors and electrical cabling and covers proper wiring techniques. Stresses the applicable *NEC®* requirements.

Conductor Terminations and Splices *(10 Hours)*

Trainee $20 **ISBN 978-0-13-604715-5**
Instructor $20 **ISBN 978-0-13-604693-6**
(Module ID 40213-08) Describes methods of terminating and splicing conductors of all types and sizes, including preparing and taping conductors.

L3 INDUSTRIAL MAINTENANCE ELECTRICAL & INSTRUMENTATION TECHNICIAN

LEVEL 3

Curriculum Notes

- 182.5 Hours
- Revised: 2009, Third Edition
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-604499-4
Instructor's Guide: $97	978-0-13-604500-7

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.

Hazardous Locations *(10 Hours)*

Trainee $20 **ISBN 978-0-13-604694-3**
Instructor $20 **ISBN 978-0-13-604744-5**
(Module ID 40301-09) Covers all classes of hazardous locations, including seals, components, and equipment approved for use in various hazardous locations.

Electronic Components *(10 Hours)*

Trainee $20 **ISBN 978-0-13-604696-7**
Instructor $20 **ISBN 978-0-13-604746-9**
(Module ID 40302-09) Introduces the principles of electronics and semiconductor theory, components, and applications.

E & I Drawings *(10 Hours)*

Trainee $20 **ISBN 978-0-13-604697-4**
Instructor $20 **ISBN 978-0-13-604747-6**
(Module ID 40303-09) Explains how to read and interpret piping and instrumentation drawings, loop sheets, flow diagrams, isometrics, and orthographics, in order to identify types of instrumentation and the specifications for installation.

Motor Controls *(15 Hours)*

Trainee $20 **ISBN 978-0-13-604698-1**
Instructor $20 **ISBN 978-0-13-604748-3**
(Module ID 40304-09) Describes selecting, sizing, and installing motor controllers. Also covers control circuit pilot devices and basic relay logic.

Distribution Equipment *(17.5 Hours)*

Trainee $20 **ISBN 978-0-13-604734-6**
Instructor $20 **ISBN 978-0-13-604749-0**
(Module ID 40305-09) Explains distribution equipment, including grounding, switchboard and ground fault maintenance, transformers, and electrical drawing identification.

Transformer Applications *(7.5 Hours)*

Trainee $20 **ISBN 978-0-13-604735-3**
Instructor $20 **ISBN 978-0-13-604750-6**
(Module ID 40306-09) Discusses transformer types, construction, connections, protection, and grounding along with capacitors and rectifiers.

Conductor Selection and Calculations *(15 Hours)*

Trainee $20 **ISBN 978-0-13-604736-0**
Instructor $20 **ISBN 978-0-13-604751-3**
(Module ID 40307-09) Covers the types of conductors used in wiring systems, including insulation, current-carrying capacity, and temperature ratings.

Temporary Grounding *(15 Hours)*

Trainee $20 **ISBN 978-0-13-604738-4**
Instructor $20 **ISBN 978-0-13-604753-7**
(Module ID 40308-09) Covers the methods used to eliminate or reduce electrical shock hazards to personnel working on electrical equipment.

Layout and Installation of Tubing and Piping Systems *(22.5 Hours)*

Trainee $20 **ISBN 978-0-13-604740-7**
Instructor $20 **ISBN 978-0-13-604755-1**
(Module ID 40309-09) Introduces piping and tubing layout procedures. Explains the steps for creating a hand-sketched isometric drawing that can be applied to a piping and tubing installation. Introduces methods and procedures used to measure, cut, bend, and support piping and tubing.

Machine Bending of Conduit *(15 Hours)*

Trainee $20 **ISBN 978-0-13-604741-4**
Instructor $20 **ISBN 978-0-13-604756-8**
(Module ID 40310-09) Covers bends in conduit up to six inches. Focuses on mechanical, hydraulic, and electrical benders.

Hydraulic Controls *(15 Hours)*

Trainee $20 **ISBN 978-0-13-604742-1**
Instructor $20 **ISBN 978-0-13-604757-5**
(Module ID 40311-09) Introduces hydraulic principles and fluids, functions and controls of system devices, hydraulic symbols, and drawings. Covers safety considerations for hydraulic systems, as well as troubleshooting.

Pneumatic Controls *(15 Hours)*

Trainee $20 **ISBN 978-0-13-604739-1**
Instructor $20 **ISBN 978-0-13-604754-4**
(Module ID 40312-09) Describes principles of atmospheric and compressed air gases, and how compressors transmit and treat compressed (pneumatic) air. Covers pneumatic system symbols, drawings, and system safety. Addresses the functions and control of pneumatic system components and provides guidelines for troubleshooting.

Motor-Operated Valves *(15 Hours)*

Trainee $20 **ISBN 978-0-13-604743-8**
Instructor $20 **ISBN 978-0-13-604758-2**
(Module ID 40313-09) Covers motor-driven valves, ranging from small, servo-mechanical actuators to large valves that could only be operated by several people if they were not motor driven. Includes electrical, pneumatic, and hydraulic operators.

L4 INDUSTRIAL MAINTENANCE ELECTRICAL & INSTRUMENTATION TECHNICIAN

LEVEL 4

Curriculum Notes

- 165 Hours
- Revised: 2009, Third Edition
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-609955-0
Instructor's Guide: $97	978-0-13-609956-7

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 $20 **ISBN 978-0-13-609163-9**
Instructor $20 **ISBN 978-0-13-609139-4**
(Module ID 40401-09) Explains the installation, utilization, and maintenance requirements for standby and emergency electrical systems.

Basic Process Control Elements, Transducers, and Transmitters *(15 Hours)*

Trainee $20 **ISBN 978-0-13-609165-3**
Instructor $20 **ISBN 978-0-13-609140-0**
(Module ID 40402-09) Discusses sensing and transmitting devices used in an instrumentation loop, along with the process variables measured by the detectors or sensors. Gives examples of technical manuals and specification sheets. Explains how control devices are selected, and how to draw basic control loop diagrams that include a measuring element, a transducer, and a transmitter.

Instrumentation Calibration and Configuration *(10 Hours)*

Trainee $20 **ISBN 978-0-13-609166-0**
Instructor $20 **ISBN 978-0-13-609141-7**
(Module ID 40403-09) Introduces methods of instrumentation calibration, including the three- and five-point methods. Covers components that require calibration in pneumatic, analog, and smart loops, as well as methods used to calibrate these components.

Pneumatic Control Valves, Actuators, and Positioners *(40 Hours)*

Trainee $20 **ISBN 978-0-13-609167-7**
Instructor $20 **ISBN 978-0-13-609142-4**
(Module ID 40404-09) Covers the construction, operation, and uses of control valves, actuators, and positioners that are driven, and in some cases controlled by, compressed air. Explains the installation and maintenance of these devices, and includes alignment and troubleshooting procedures.

Performing Loop Checks *(7.5 Hours)*

Trainee $20 **ISBN 978-0-13-609168-4**
Instructor $20 **ISBN 978-0-13-609143-1**
(Module ID 40405-09) Covers loop check steps, including verifying mechanical installation, validating that the loop has correct tag numbers, performing loop checks, and proving the loop.

Troubleshooting and Commissioning a Loop *(10 Hours)*

Trainee $20 **ISBN 978-0-13-609169-1**
Instructor $20 **ISBN 978-0-13-610439-1**
(Module ID 40406-09) Teaches troubleshooting techniques used to locate problems in control loops, and how to isolate a loop in order to troubleshoot it. Covers commissioning of a loop once it is repaired, loop checked, and calibrated.

Process Control Loops and Tuning *(20 Hours)*

Trainee $20 **ISBN 978-0-13-609135-6**
Instructor $20 **ISBN 978-0-13-610440-7**
(Module ID 40407-09) Describes control loops, devices, and terms. Introduces formulas and their applications to PID control. Offers a theory-based approach to PID control and its application in industrial process control. Addresses open, closed, and visual loop tuning.

Data Networks *(15 Hours)*

Trainee $20 **ISBN 978-0-13-609138-7**
Instructor $20 **ISBN 978-0-13-610443-8**
(Module ID 40408-09) Introduces terms associated with data network devices and computers used in industrial facilities. Explains how data network devices and computers are interconnected for communication purposes. Describes how open connectivity is used in industrial data networks, and explores the hardware devices used in a data highway system.

Programmable Logic Controllers *(17.5 Hours)*

Trainee $20 **ISBN 978-0-13-609136-3**
Instructor $20 **ISBN 978-0-13-610441-4**
(Module ID 40409-09) Introduces the application of PLCs in industrial process control, as well as the binary numbering system used in computer-based control. Covers components of PLCs, including power supplies, I/O modules, processor modules, types of communication bus, and memory.

Distributed Control Systems *(17.5 Hours)*

Trainee $20 **ISBN 978-0-13-609137-0**
Instructor $20 **ISBN 978-0-13-610442-1**
(Module ID 40410-09) Describes how DCS was developed by combining the technologies of single loop control, direct digital control, and supervisory control. Covers DCS hardware requirements, how control loops are implemented into a DCS, types of data transmission used in DCS, communication protocols, and human interfaces.

L1 INDUSTRIAL MAINTENANCE MECHANIC

LEVEL 1

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. 11 for ordering information.)
- Revised: 2007, Third Edition
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $67	978-0-13-228608-4
Instructor's Guide: $67	978-0-13-228609-1

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 *(2.5 Hours)*
Trainee $20 ISBN 978-0-13-614583-7
Instructor $20 ISBN 978-0-13-614563-9
(Module ID 32101-07) 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 in industrial maintenance. Describes the responsibilities and characteristics of successful workers.

Tools of the Trade *(5 Hours)*
Trainee $20 ISBN 978-0-13-614584-4
Instructor $20 ISBN 978-0-13-614564-6
(Module ID 32102-07) Introduces hand and power tools used in industrial maintenance. Covers safety procedures and proper use of these tools.

Fasteners and Anchors *(5 Hours)*
Trainee $20 ISBN 978-0-13-614585-1
Instructor $20 ISBN 978-0-13-614565-3
(Module ID 32103-07) Covers the 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 $20 ISBN 978-0-13-614586-8
Instructor $20 ISBN 978-0-13-614566-0
(Module ID 32104-07) Explains the safety requirements for oxyfuel cutting. Identifies oxyfuel cutting equipment and provides instructions for setting up, lighting, and using the equipment. Explains how to perform straight line cutting, piercing, beveling, washing, and gouging.

Gaskets and Packing *(10 Hours)*
Trainee $20 ISBN 978-0-13-614588-2
Instructor $20 ISBN 978-0-13-614567-7
(Module ID 32105-07) Introduces gaskets and gasket material, packing and packing material, and types of O-ring material. Explains the use of gaskets, packing, and O-rings, and how to fabricate a gasket.

Craft-Related Mathematics *(15 Hours)*
Trainee $20 ISBN 978-0-13-614589-9
Instructor $20 ISBN 978-0-13-614568-4
(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 ISBN 978-0-13-614590-5
Instructor $20 ISBN 978-0-13-614604-9
(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 ISBN 978-0-13-614591-2
Instructor $20 ISBN 978-0-13-614605-6
(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 ISBN 978-0-13-614592-9
Instructor $20 ISBN 978-0-13-614606-3
(Module ID 32109-07) Identifies different types of valves and describes their installation as well as valve storage and handling.

Introduction to Test Equipment *(7.5 Hours)*
Trainee $20 ISBN 978-0-13-614593-6
Instructor $20 ISBN 978-0-13-614607-0
(Module ID 32110-07) Introduces test equipment for industrial maintenance, including tachometers, pyrometers, strobe meters, voltage testers, and automated diagnostic tools.

Material Handling and Hand Rigging *(15 Hours)*
Trainee $20 ISBN 978-0-13-614594-3
Instructor $20 ISBN 978-0-13-614608-7
(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 ISBN 978-0-13-614560-8
Instructor $20 ISBN 978-0-13-614609-4
(Module ID 32112-07) Introduces the safety procedures and methods of operation for motorized support equipment, including forklifts, personnel lifts, compressors, and generators.

Lubrication *(12.5 Hours)*
Trainee $20 ISBN 978-0-13-614562-2
Instructor $20 ISBN 978-0-13-614611-7
(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
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-614392-5
Instructor's Guide: $97	978-0-13-614393-2

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.

Basic Layout *(20 Hours)*
Trainee $20 ISBN 978-0-13-604621-9
Instructor $20 ISBN 978-0-13-604668-4
(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 ISBN 978-0-13-604622-6
Instructor $20 ISBN 978-0-13-604669-1
(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 ISBN 978-0-13-604623-3
Instructor $20 ISBN 978-0-13-604670-7
(Module ID 32203-07) Covers the selection, preparation, joining, and support of copper and plastic piping and fittings.

Introduction to Ferrous Metal Piping Practices *(5 Hours)*
Trainee $20 ISBN 978-0-13-604624-0
Instructor $20 ISBN 978-0-13-604671-4
(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 ISBN 978-0-13-604625-7
Instructor $20 ISBN 978-0-13-604672-1
(Module ID 32205-07) Explains how to remove and install threaded and flanged valves, how to replace valve stem O-ring and bonnet gaskets, and how to repack a valve stuffing box. Also discusses the purpose of valve packing.

Hydrostatic and Pneumatic Testing *(10 Hours)*
Trainee $20 ISBN 978-0-13-604626-4
Instructor $20 ISBN 978-0-13-604673-8
(Module ID 32206-07) Describes non-destructive and pressure testing of systems and equipment.

Introduction to Bearings *(15 Hours)*
Trainee $20 ISBN 978-0-13-604627-1
Instructor $20 ISBN 978-0-13-604674-5
(Module ID 32207-07) Introduces plain, ball, roller, thrust, guide, flanged, pillow block, and takeup bearings. Discusses bearing materials and designations.

Low-Pressure Steam Systems *(10 Hours)*
Trainee $20 ISBN 978-0-13-604628-8
Instructor $20 ISBN 978-0-13-604675-2
(Module ID 32208-07) Introduces the components and functions of basic steam systems, including boilers, steam traps, and blowdown recovery systems.

High-Pressure Steam Systems and Auxiliaries *(20 Hours)*
Trainee $20 ISBN 978-0-13-604664-6
Instructor $20 ISBN 978-0-13-604676-9
(Module ID 32209-07) Explains the functioning of high-pressure steam systems used in industry.

Distillation Towers and Vessels *(20 Hours)*

Trainee $20 ISBN 978-0-13-604665-3
Instructor $20 ISBN 978-0-13-604677-6

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

Heaters, Furnaces, Heat Exchangers, Cooling Towers, and Fin Fans *(30 Hours)*

Trainee $20 ISBN 978-0-13-604666-0
Instructor $20 ISBN 978-0-13-604679-0

(Module ID 32211-07) Introduces equipment used to transfer and remove heat from systems in process.

Introduction to Tube Work *(10 Hours)*

Trainee $20 ISBN 978-0-13-604667-7
Instructor $20 ISBN 978-0-13-604680-6

(Module ID 32212-07) Covers the basics of working with heat exchanger and furnace tubing and tube sheets.

L3 INDUSTRIAL MAINTENANCE MECHANIC

LEVEL 3

Curriculum Notes

- 175 Hours
- Revised: 2008, Third Edition
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-604496-3
Instructor's Guide: $97	978-0-13-604498-7

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 ISBN 978-0-13-604681-3
Instructor $20 ISBN 978-0-13-604656-1

(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 ISBN 978-0-13-604682-0
Instructor $20 ISBN 978-0-13-604657-8

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

Installing Bearings *(20 Hours)*

Trainee $20 ISBN 978-0-13-604683-7
Instructor $20 ISBN 978-0-13- 604658-5

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

Installing Couplings *(15 Hours)*

Trainee $20 ISBN 978-0-13-604684-4
Instructor $20 ISBN 978-0-13-604659-2

(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)*

Trainee $20 ISBN 978-0-13-604685-1
Instructor $20 ISBN 978-0-13-604661-5

(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)*

Trainee $20 ISBN 978-0-13-604686-8
Instructor $20 ISBN 978-0-13-604662-2

(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)*

Trainee $20 ISBN 978-0-13-604688-2
Instructor $20 ISBN 978-0-13-604663-9

(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)*

Trainee $20 ISBN 978-0-13-604689-9
Instructor $20 ISBN 978-0-13-604699-8

(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.

L4 INDUSTRIAL MAINTENANCE MECHANIC

LEVEL 4

Curriculum Notes

- 170 Hours
- Revised: 2009, Third Edition
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-609957-4
Instructor's Guide: $97	978-0-13-609959-8

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.

Preventive and Predictive Maintenance *(10 Hours)*

Trainee $20 ISBN 978-0-13-610445-2
Instructor $20 ISBN 978-0-13-610456-8

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

Advanced Blueprint Reading *(25 Hours)*

Trainee $20 ISBN 978-0-13-610446-9
Instructor $20 ISBN 978-0-13-610457-5

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

Compressors and Pneumatic Systems *(35 Hours)*

Trainee $20 ISBN 978-0-13-610447-6
Instructor $20 ISBN 978-0-13-610458-2

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

Reverse Alignment *(30 Hours)*

Trainee $20 ISBN 978-0-13-610448-3
Instructor $20 ISBN 978-0-13-610459-9

(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
Instructor $20 ISBN 978-0-13-610460-5

(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)*

Trainee $20 ISBN 978-0-13-610450-6
Instructor $20 ISBN 978-0-13-610461-2

(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
Instructor $20 ISBN 978-0-13-610462-9

(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)*

Trainee $20 ISBN 978-0-13-610453-7
Instructor $20 ISBN 978-0-13-610463-6

(Module ID 32408-09) Describes types and operation of gearboxes, and gearbox diagnostics. Explains how to troubleshoot, remove, and disassemble gearboxes, how to identify gear wear patterns, and how to install and maintain gearboxes.

Advanced Topics

Advanced Towers and Vessels *(15 Hours)*

Trainee $20 ISBN 978-0-13-610455-1
Instructor $20 ISBN 978-0-13-610430-8

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

Troubleshooting and Repairing Conveyors *(12.5 Hours)*

Trainee $20 ISBN 978-0-13-602300-5
Instructor $20 ISBN 978-0-13-602302-9

(Module ID 32502-09) Describes maintaining and repairing belt, roller, chain, screw, and pneumatic conveyors.

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. 11 for ordering information.)
- Revised: 2014, Third Edition
- New printed Instructor's Package includes lesson plans and instructor's copy of Trainee Guide with an access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $67	978-0-13-383080-4
Instructor's Package: $67	978-0-13-415783-2

MODULES

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

Instrumentation Safety Practices *(12.5 Hours)*

Trainee $20 ISBN 978-0-13-378832-7
Instructor $20 ISBN 978-0-13-378858-7
(Module ID 12115-14) Covers precautions for electrical hazards found on the job and teaches the OSHA-mandated lockout/tagout procedure. Identifies safety practices related to potentially hazardous tools and materials.

Hand and Power Tools for Instrumentation *(12.5 Hours)*

Trainee $20 ISBN 978-0-13-378834-1
Instructor $20 ISBN 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 ISBN 978-0-13-378838-9
Instructor $20 ISBN 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 ISBN 978-0-13-378839-6
Instructor $20 ISBN 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 ISBN 978-0-13-378840-2
Instructor $20 ISBN 978-0-13-378863-1
(Module ID 12304-14) Covers the methods used in receiving, inspecting, handling, and storing project-related instrumentation equipment.

Electrical Systems for Instrumentation *(12.5 Hours)*

Trainee $20 ISBN 978-0-13-378841-9
Instructor $20 ISBN 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 ISBN 978-0-13-378842-6
Instructor $20 ISBN 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 ISBN 978-0-13-378843-3
Instructor $20 ISBN 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 ISBN 978-0-13-378844-0
Instructor $20 ISBN 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 ISBN 978-0-13-378853-2
Instructor $20 ISBN 978-0-13-378868-6
(Module ID 12111-14) Introduces types of tubing, tubing materials, fittings, and tools. Covers proper storage and handling, cutting, deburring, reaming, bending, and joining of tubing.

Steel Piping Practices *(10 Hours)*

Trainee $20 ISBN 978-0-13-378854-9
Instructor $20 ISBN 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 ISBN 978-0-13-378856-3
Instructor $20 ISBN 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
- New printed Instructor's Package includes lesson plans and instructor's copy of Trainee Guide with an access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-413101-6
Instructor's Package: $97	978-0-13-419660-2

MODULES

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

Temperature, Pressure, Level, and Flow *(15 Hours)*

Trainee $20 ISBN 978-0-13-448255-2
Instructor $20 ISBN 978-0-13-448273-6
(Module ID 12110-15) Examines the characteristics of temperature, pressure, level, and flow, and describes the units of measure for each variable. Introduces common devices used to measure these process variables and the basic principles of operation for each device.

Instrument Fitter's Math *(15 Hours)*

Trainee $20 ISBN 978-0-13-448257-6
Instructor $20 ISBN 978-0-13-448258-3
(Module ID 12301-15) Discusses the application of right triangles in bending and installing tubing and conduit as it applies to instrumentation. Shows how to use a scientific calculator in applying instrumentation piping and fitting math.

Instrument Drawings and Documents, Part Two *(17.5 Hours)*

Trainee $20 ISBN 978-0-13-448260-6
Instructor $20 ISBN 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)*

(Module ID 33205-10; from *Electronic Systems Technician Level 2*)
Trainee $20 ISBN 978-0-13-266158-4
Instructor $20 ISBN 978-0-13-266169-0

Panel-Mounted Instruments *(10 Hours)*

Trainee $20 ISBN 978-0-13-448261-3
Instructor $20 ISBN 978-0-13-448262-0
(Module ID 12212-15) Explains the selection of instruments to be panel-mounted, locating the instruments using drawings, and procedures for installing the instruments in the panels.

Installing Field-Mounted Instruments *(25 Hours)*

Trainee $20 ISBN 978-0-13-448263-7
Instructor $20 ISBN 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 ISBN 978-0-13-448267-5
Instructor $20 ISBN 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 ISBN 978-0-13-448269-9
Instructor $20 ISBN 978-0-13-448266-8
(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)

Trainee $20 **ISBN 978-0-13-448270-5**
Instructor $20 **ISBN 978-0-13-448271-2**

(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)*

Trainee $20 **ISBN 978-0-13-448272-9**
Instructor $20 **ISBN 978-0-13-448276-7**

(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)

Trainee $20 **ISBN 978-0-13-448274-3**
Instructor $20 **ISBN 978-0-13-448256-9**

(Module ID 12210-15) Presents the construction, operation, and uses of filters, regulators, and dryers. Covers identification and selection of the correct component for installation using applicable specifications and schematics.

L3 INSTRUMENTATION

LEVEL 3

Curriculum Notes

- 150 Hours
- Revised: 2016, Third Edition
- New printed Instructor's Package includes lesson plans and instructor's copy of Trainee Guide with an access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-413095-8
Instructor's Package: $97	978-0-13-416733-6

MODULES

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

Control Valves, Actuators, and Positioners
(15 Hours)

Trainee $20 **ISBN 978-0-13-448277-4**
Instructor $20 **ISBN 978-0-13-448280-4**

(Module ID 12207-16) Covers the construction and operation of various piping-system valves and actuators. Discusses the application and operation of valve positioners. Presents valve selection criteria and explains how to interpret valve and actuator markings and nameplate information.

Detectors, Secondary Elements, Transducers, and Transmitters *(25 Hours)*

Trainee $20 **ISBN 978-0-13-448278-1**
Instructor $20 **ISBN 978-0-13-448279-8**

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

Instrumentation Electrical Circuitry *(25 Hours)*

Trainee $20 **ISBN 978-0-13-448281-1**
Instructor $20 **ISBN 978-0-13-448282-8**

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

Relays and Timers *(10 Hours)*

Trainee $20 **ISBN 978-0-13-448283-5**
Instructor $20 **ISBN 978-0-13-448285-9**

(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 Photoelectric Devices *(10 Hours)*

Trainee $20 **ISBN 978-0-13-448286-6**
Instructor $20 **ISBN 978-0-13-448287-3**

(Module ID 12209-16) Covers the principles of operation and applications of switches and photoelectric devices in the instrumentation environment.

Terminating Conductors *(20 Hours)*

Trainee $20 **ISBN 978-0-13-448288-0**
Instructor $20 **ISBN 978-0-13-448290-3**

(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 12306-16) Teaches the basic concepts of grounding and shielding, including wire and cable identification. Defines various types of noise that can be induced into instrumentation wiring and describes the methods used to reduce or eliminate it.

Process Control Theory *(25 Hours)*

Trainee $20 **ISBN 978-0-13-448294-1**
Instructor $20 **ISBN 978-0-13-448295-8**

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

Controllers *(10 Hours)*

Trainee $20 **ISBN 978-0-13-448296-5**
Instructor $20 **ISBN 978-0-13-448297-2**

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

L4 INSTRUMENTATION

LEVEL 4

Curriculum Notes

- 165 Hours
- Revised: 2016, Third Edition
- New printed Instructor's Package includes lesson plans and instructor's copy of Trainee Guide with an access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-449532-3
Instructor's Guide: $97	978-0-13-454302-4

MODULES

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

Instrument Calibration and Configuration *(60 Hours)*

Trainee $20 **ISBN 978-0-13-448298-9**
Instructor $20 **ISBN 978-0-13-448299-6**

(Module ID 12402-16) Introduces the basic concepts of calibration, including the three- and five-point methods. Addresses pneumatic, analog, and smart instrumentation calibration methods. Also covers other process control devices that require calibration.

Proving, Commissioning, and Troubleshooting a Loop *(17.5 Hours)*

Trainee $20 **ISBN 978-0-13-448300-9**
Instructor $20 **ISBN 978-0-13-448301-6**

(Module ID 12410-16) Explains the three stages in readying a loop for operation: checking, proving, and commissioning. Examines the key ideas behind each step and stresses the differences. Explores troubleshooting techniques and methodologies, with an emphasis on their use during the three stages of readying a loop.

Tuning Loops *(15 hours)*

Trainee $20 **ISBN 978-0-13-448303-0**
Instructor $20 **ISBN 978-0-13-448302-3**

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

Digital Logic Circuits *(15 Hours)*

Trainee $20 **ISBN 978-0-13-448305-4**
Instructor $20 **ISBN 978-0-13-448304-7**

(Module ID 12401-16) Introduces the basic ideas of digital electronics. Presents gates, combination logic, and truth tables. Addresses memory devices, counters, and arithmetic circuits as well as the numbering systems commonly used in digital systems.

Programmable Logic Controllers *(12.5 Hours)*

Trainee $20 **ISBN 978-0-13-448306-1**
Instructor $20 **ISBN 978-0-13-448307-8**

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

Distributed Control Systems *(15 Hours)*

Trainee $20 **ISBN 978-0-13-448308-5**
Instructor $20 **ISBN 978-0-13-448310-8**

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

Analyzers and Monitors *(30 Hours)*

Trainee $20 **ISBN 978-0-13-448311-5**
Instructor $20 **ISBN 978-0-13-448312-2**

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

Ironworking

L1 IRONWORKING

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. 11 for ordering information.)**
- **Revised: 2011, Second Edition**
- **Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.**
- **A Spanish translation is available. Please see NCCER's online catalog for more information.**

PAPERBACK	ISBN
Trainee Guide: $67	**978-0-13-213714-0**
Instructor's Guide: $67	**978-0-13-213715-7**

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 the Trade *(5 Hours)*

Trainee $20 **ISBN 978-0-13-213800-0**
Instructor $20 **ISBN 978-0-13-215113-9**

(Module ID 30101-11) Discusses the historical development of the ironworking trade. Explains personal qualities that contribute to successful employment. Describes the organization and purpose of apprenticeship training, and the safety obligations of the employer and employee.

Trade Safety *(12.5 Hours)*

Trainee $20 **ISBN 978-0-13-213801-7**
Instructor $20 **ISBN 978-0-13-215114-6**

(Module ID 30102-11) Describes the consequences of on-the-job accidents and the responsibilities of OSHA. Identifies potential ironworker health and safety hazards and safe work practices around cranes. Explains the safe use of personnel lifts. Discusses the safe use and operation of aerial platforms, hoists, and fall protection systems.

Tools and Equipment of the Trade *(10 Hours)*

Trainee $20 **ISBN 978-0-13-213803-1**
Instructor $20 **ISBN 978-0-13-215115-3**

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

Fastening *(5 Hours)*

Trainee $20 **ISBN 978-0-13-213804-8**
Instructor $20 **ISBN 978-0-13-215116-0**

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

Mobile Construction Cranes *(10 Hours)*

Trainee $20 **ISBN 978-0-13-213805-5**
Instructor $20 **ISBN 978-0-13-215117-7**

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

Rigging Equipment *(10 Hours)*

Trainee $20 **ISBN 978-0-13-213806-2**
Instructor $20 **ISBN 978-0-13-215118-4**

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

Rigging Practices *(15 Hours)*

Trainee $20 **ISBN 978-0-13-215102-3**
Instructor $20 **ISBN 978-0-13-215119-1**

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

Trade Drawings One *(12.5 Hours)*

Trainee $20 **ISBN 978-0-13-215103-0**
Instructor $20 **ISBN 978-0-13-215121-4**

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

Structural Ironworking One *(7.5 Hours)*

Trainee $20 **ISBN 978-0-13-215104-7**
Instructor $20 **ISBN 978-0-13-215122-1**

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

Plumbing, Aligning, and Guying *(5 Hours)*

Trainee $20 **ISBN 978-0-13-215106-1**
Instructor $20 **ISBN 978-0-13-215123-8**

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

Oxyfuel Cutting *(17.5 Hours)*

(Module ID 29102-09; from *Welding Level One*)

Trainee $20 **ISBN 978-0-13-215107-8**
Instructor $20 **ISBN 978-0-13-215124-5**

Introduction to Arc Welding *(22.5 Hours)*

Trainee $20 **ISBN 978-0-13-215108-5**
Instructor $20 **ISBN 978-0-13-215125-2**

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

Bar Joists and Girders *(5 Hours)*

Trainee $20 **ISBN 978-0-13-215109-2**
Instructor $20 **ISBN 978-0-13-215126-9**

(Module ID 30113-11) Explains how to recognize types of bar joists and how they are designated. Describes the proper procedures for rigging and storing steel joists. Explains the use of joist girders in steel joist construction systems and the proper erection procedures for bar joists. Includes *OSHA Subpart R.*

Metal Decking *(10 Hours)*

Trainee $20 **ISBN 978-0-13-215110-8**
Instructor $20 **ISBN 978-0-13-215127-6**

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

Field Fabrication *(15 Hours)*

Trainee $20 ISBN 978-0-13-215111-5
Instructor $20 ISBN 978-013-215093-4
(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.

L2 IRONWORKING

LEVEL 2

Curriculum Notes

- 162.5 Hours
- Revised: 2011, Second Edition
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-257822-6
Instructor's Guide: $97	978-0-13-266252-9

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.

Trade Math *(25 Hours)*

Trainee $20 ISBN 978-0-13-266447-9
Instructor $20 ISBN 978-0-13-266458-5
(Module ID 30201-11) Explains fractions and basic math, and includes multiple opportunities for practical applications.

Weld Quality *(10 Hours)*

(Module ID 29106-09; from *Welding Level One*)
Trainee $20 ISBN 978-0-13-275109-4
Instructor $20 ISBN 978-0-13-275110-0

Position Arc Welding *(20 Hours)*

Trainee $20 ISBN 978-0-13-266448-6
Instructor $20 ISBN 978-0-13-266459-2
(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.

Forklifts *(17.5 Hours)*

Trainee $20 ISBN 978-0-13-266449-3
Instructor $20 ISBN 978-0-13-266460-8
(Module ID 30203-11) Identifies the basic components of forklifts and the corresponding hand signals. Explains safe practices and how to perform inspections. Covers how to read load charts and how to operate forklifts.

Trade Drawings Two *(10 Hours)*

Trainee $20 ISBN 978-0-13-266451-6
Instructor $20 ISBN 978-0-13-266463-9
(Module ID 30204-11) Introduces types of structural plans and describes the information included on each type. Presents the sequences of erection plans for each step of construction and identifies the symbols and abbreviations used on drawings.

Intermediate Rigging *(10 Hours)*

(Module ID 38201-11; from *Intermediate Rigging*)
Trainee $20 ISBN 978-0-13-266181-2
Instructor $20 ISBN 978-0-13-266185-0

Structural Ironworking Two *(30 Hours)*

Trainee $20 ISBN 978-0-13-266454-7
Instructor $20 ISBN 978-0-13-266465-3
(Module ID 30205-11) Describes pre-erection activities for structural steel. Provides procedures for erecting bearing devices, columns, beams, girders, joists, bracing, and bridging.

Steel Joists and Joist Girders *(15 Hours)*

Trainee $20 ISBN 978-0-13-266455-4
Instructor $20 ISBN 978-0-13-266466-0
(Module ID 30206-11) Identifies the types of joists, methods of end support, and the types of bridging available. Explains how to locate the ironworking information on framing plans and describes steel joist installation procedures. Describes the conditions necessary and the benefits of panelizing bar joist.

Tower Cranes *(15 Hours)*

Trainee $20 ISBN 978-0-13-266456-1
Instructor $20 ISBN 978-0-13-266467-7
(Module ID 30207-11) Describes safe practices when erecting steel using tower cranes. Explains the difference between erecting steel with a mobile crane versus a tower crane. Describes tower crane hand and verbal signals.

Survey Equipment Use and Care One *(10 Hours)*

Trainee $20 ISBN 978-0-13-266457-8
Instructor $20 ISBN 978-0-13-266468-4
(Module ID 30208-11) Identifies survey equipment and uses. Explains the proper set up and use of a builder's level and a theodolite. Covers how to shoot elevations, sweep a column for plumb, and set up over a point and back sight to another point.

L3 IRONWORKING

LEVEL 3

Curriculum Notes

- 150 Hours
- Revised: 2012, Second Edition
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-257785-4
Instructor's Guide: $97	978-0-13-266259-8

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.

Applied Trade Math *(5 Hours)*

Trainee $20 ISBN 978-0-13-292280-7
Instructor $20 ISBN 978-0-13-292293-7
(Module ID 30313-12) Explains the math needed to calculate the size of cribbing or blocking needed for a load; parts of line, maximum load, and line pull for lifting operations; sling capacities; and load distribution for two-crane lifts.

Flux Core for Ironworking *(40 Hours)*

Trainee $20 ISBN 978-0-13-292281-4
Instructor $20 ISBN 978-0-13-292294-4
(Module ID 30314-12) Describes the equipment and methods used in flux core arc welding (FCAW). Includes proper selection and use of filler metals and shielding gases, as well as techniques for performing fillet and V-groove welding in various positions.

Stud Welding *(10 Hours)*

Trainee $20 ISBN 978-0-13-292282-1
Instructor $20 ISBN 978-0-13-292295-1
(Module ID 30304-12) Introduces the stud welding process, stud welding safety, and identifies the equipment used to weld studs. Provides step-by-step procedures to set up welding equipment and guidelines to make acceptable stud welds with proper stud placement. Explains testing of stud welds.

Structural Ironworking Three *(10 Hours)*

Trainee $20 ISBN 978-0-13-292283-8
Instructor $20 ISBN 978-0-13-292296-8
(Module ID 30312-12) Explains the techniques used to plumb, align and guy steel structures, including the associated hazards and risks. Provides information and procedures related to the installation of trusses and curtain walls.

Advanced Rigging *(10 Hours)*

(Module ID 38301-11; from *Advanced Rigging*)
Trainee $20 ISBN 978-0-13-266189-8
Instructor $20 ISBN 978-0-13-266192-8

Precast/Tilt-Up Erection *(12.5 Hours)*

Trainee $20 ISBN 978-0-13-292285-2
Instructor $20 ISBN 978-0-13-292297-5
(Module ID 30311-12) Describes the fabrication and uses of precast concrete elements and cast-in-place tilt-up wall systems. Focuses on rigging practices associated with these two distinct construction methods and the role of ironworkers in their installation.

Special Application Hoisting Devices *(10 Hours)*

Trainee $20 ISBN 978-0-13-292286-9
Instructor $20 ISBN 978-0-13-292298-2
(Module ID 30307-12) Explains techniques for rigging and moving equipment using a variety of hoisting devices, including gin poles, Chicago booms, A-frames, davits, balance beams, pump handles, high lines, caterpillar dollies, rollers. Also covers special cranes, including derricks, gantries, HLDs, trolley cranes, and jacking frames.

Survey Equipment Use and Care Two *(15 Hours)*

Trainee $20 ISBN 978-0-13-292287-6
Instructor $20 ISBN 978-0-13-292299-9
(Module ID 30315-12) Focuses on the total station and its uses, including setup and controls. It includes information on primary and secondary control points and procedures for turning horizontal angles and plumbing columns and wall panels.

Pre-Engineered Systems *(5 Hours)*

Trainee $20 ISBN 978-0-13-292288-3
Instructor $20 ISBN 978-0-13-292300-2
(Module ID 30302-12) Identifies the structural components and accessories of metal buildings and describes their installation. Describes the pre-erection and erection procedures that apply to their installation and the safety precautions associated with their installation.

Miscellaneous/Ornamental Ironworking *(5 Hours)*

Trainee $20 ISBN 978-0-13-292289-0
Instructor $20 ISBN 978-0-13-292302-6
(Module ID 30303-12) Identifies the types of ornamental metal and describes the different types of components used in ornamental ironworking. Explains the skills required to fabricate and install ornamental components safely.

Grating and Checkered Plate *(5 Hours)*

Trainee $20 **ISBN 978-0-13-292290-6**
Instructor $20 **ISBN 978-0-13-292303-3**

(Module ID 30316-12) Provides general information and procedures for the installation and attachment of gratings and checker plate. Describes the rigging methods associated with grating and checkered plate.

Air Carbon Arc Cutting and Gouging *(12.5 Hours)*

(Module ID 29104-09; from *Welding Level One*)

Trainee $20 **ISBN 978-0-13-610530-5**
Instructor $20 **ISBN 978-0-13-610508-4**

Demolition *(10 Hours)*

Trainee $20 **ISBN 978-0-13-292291-3**
Instructor $20 **ISBN 978-0-13-292304-0**

(Module ID 30310-12) Identifies the tools used to remove rivets and explains the demolition skills required to safely remove structural steel beams, steel columns, and steel reinforced concrete columns.

Masonry

L1 MASONRY

LEVEL 1

Curriculum Notes

- 205 Hours (Includes 72.5 hours of *Core Curriculum*, which is a prerequisite for Level 1 completion and must be purchased separately. See p. 11 for ordering information.)
- Revised: 2013, Fourth Edition
- New printed Instructor's Package includes lesson plans and instructor's copy of Trainee Guide with an access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.
- A Spanish translation of the third edition is available. Please see NCCER's online catalog for more information.

HARDCOVER	ISBN
Trainee Guide: $69	978-0-13-375402-5
PAPERBACK	**ISBN**
Trainee Guide: $67	978-0-13-340248-3
Instructor's Package: $67	978-0-13-416630-8

MODULES

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

Introduction to Masonry *(12.5 Hours)*

Trainee $20 **ISBN 978-0-13-377930-1**
Instructor $20 **ISBN 978-0-13-377936-3**

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

Masonry Safety *(15 Hours)*

Trainee $20 **ISBN 978-0-13-377931-8**
Instructor $20 **ISBN 978-0-13-377937-0**

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

Masonry Tools & Equipment *(15 Hours)*

Trainee $20 **ISBN 978-0-13-377932-5**
Instructor $20 **ISBN 978-0-13-377939-4**

(Module ID 28102-13) Describes a variety of hand tools, measuring tools, mortar equipment, power tools and equipment, and lifting equipment that masons use on the job, and explains how to use these tools correctly and safely. Provides instructions for assembling and disassembling scaffolds.

Measurements, Drawings, and Specifications *(10 Hours)*

Trainee $20 **ISBN 978-0-13-377933-2**
Instructor $20 **ISBN 978-0-13-377940-0**

(Module ID 28103-13) Reviews the calculation of distances and areas common in masonry work; describes the information found on residential construction drawings; and explains the role of specifications, standards, and codes.

Mortar *(10 Hours)*

Trainee $20 **ISBN 978-0-13-377934-9**
Instructor $20 **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)*

Trainee $20 **ISBN 978-0-13-377935-6**
Instructor $20 **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.

L2 MASONRY

LEVEL 2

Curriculum Notes

- 152.5 Hours
- Revised: 2014, Fourth Edition
- New printed Instructor's Package includes lesson plans and instructor's copy of Trainee Guide with an access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-377970-7
Instructor's Package: $97	978-0-13-414125-1

MODULES

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

Residential Plans and Drawing Interpretation (12.5 Hours)

Trainee $20 **ISBN 978-0-13-378178-6**
Instructor $20 **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 plans, dimensioning and scaling, and estimating materials quantities from information on the plans.

Residential Masonry *(25 Hours)*

Trainee $20 **ISBN 978-0-13-378179-3**
Instructor $20 **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)*

Trainee $20 **ISBN 978-0-13-378180-9**
Instructor $20 **ISBN 978-0-13-382749-1**

(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)*

Trainee $20 **ISBN 978-0-13-378181-6**
Instructor $20 **ISBN 978-0-13-382750-7**

(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)*

Trainee $20 **ISBN 978-0-13-378182-3**
Instructor $20 **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.

Effect of Climate on Masonry *(20 Hours)*

Trainee $20 **ISBN 978-0-13-378184-7**
Instructor $20 **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)

Trainee $20 ISBN 978-0-13-382523-7
Instructor $20 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.

L3 MASONRY

LEVEL 3

Curriculum Notes

- 200 Hours
- Revised: 2014, Fourth Edition
- New printed Instructor's Package includes lesson plans and instructor's copy of Trainee Guide with an access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-375045-4
Instructor's Package: $97	978-0-13-414124-4

MODULES

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

Elevated Masonry *(15 Hours)*

Trainee $20 ISBN 978-0-13-409845-6
Instructor $20 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, and how to identify common types of elevated walls. Stresses safety around equipment such as cranes and hoists.

Specialized Materials and Techniques *(60 Hours)*

Trainee $20 ISBN 978-0-13-409844-9
Instructor $20 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)*

Trainee $20 ISBN 978-0-13-409843-2
Instructor $20 ISBN 978-0-13-409851-7

(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)*

Trainee $20 ISBN 978-0-13-409842-5
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 from structural drawings as a baseline. Describes requirements for these drawings, as well as how to interpret and create plans for architectural, structural, and shop drawings.

Estimating *(25 Hours)*

Trainee $20 ISBN 978-0-13-409841-8
Instructor $20 ISBN 978-0-13-409848-7

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

Site Layout – Distance Measurement and Leveling *(20 Hours)*

Trainee $20 ISBN 978-0-13-409857-9
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.

Stone Masonry *(15 Hours)*

Trainee $20 ISBN 978-0-13-409856-2
Instructor $20 ISBN 978-0-13-409846-3

(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; see p. 69)

Trainee $43 ISBN 978-0-13-409855-5
Instructor $43 ISBN 978-0-13-409860-9

Mechanical Insulating

L1 MECHANICAL INSULATING

LEVEL 1

Curriculum Notes REVISION COMING SOON!

- 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. 11 for ordering information.)
- Updated: 1999

PAPERBACK	ISBN
Trainee Guide: $67	978-0-13-909359-3
Instructor Guide: $67	978-0-13-909383-8

MODULES

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

Orientation *(5 Hours)*

Trainee $19 ISBN 978-0-13-909169-8
Instructor $19 ISBN 978-0-13-909235-0

(Module ID 19101) Provides an overview of the insulation industry, factors to consider when choosing a vocation in the insulation industry, and why insulation is used.

Trade Relations *(7.5 Hours)*

Trainee $19 ISBN 978-0-13-909177-3
Instructor $19 ISBN 978-0-13-909243-5

(Module ID 19102) Discusses the importance of contracts, relationships with other members of the construction team, and effective communication.

Tools of the Trade *(7.5 Hours)*

Trainee $19 ISBN 978-0-13-909185-8
Instructor $19 ISBN 978-0-13-909250-3

(Module ID 19103) Identifies tools of the insulation trade, their proper use and care, and safety procedures for each.

Material Handling, Storage, and Distribution *(2.5 Hours)*

Trainee $19 ISBN 978-0-13-909193-3
Instructor $19 ISBN 978-0-13-909268-4

(Module ID 19104) Covers receiving, stacking, and storage of insulation materials, as well as material movement.

Characteristics of Pipe Insulation *(5 Hours)*

Trainee $19 ISBN 978-0-13-909201-5
Instructor $19 ISBN 978-0-13-909276-3

(Module ID 19105) Covers identification of types, sizes, and uses of pipe and insulation thickness. Explains the relationship between pipe size and insulation size.

Installing Fiberglass Pipe Insulation *(30 Hours)*

Trainee $19 ISBN 978-0-13-909219-0
Instructor $19 ISBN 978-0-13-909284-8

(Module ID 19106) Describes characteristics of fiberglass pipe insulation and sizing requirements, as well as characteristics of ASJ jacketing.

Installing Pipe Fittings, Valves, and Flanges
(40 Hours)

Trainee $19 ISBN 978-0-13-909227-5
Instructor $19 ISBN 978-0-13-909292-3

(Module ID 19107) Explains insulation requirements for basic types of fittings, valves, and flanges; cutting and installing mitered segments to pipe elbows; cutting for application to flanged pipe valves and insulating pipe flanges; and cutting and installing plug 90-degree ells.

L2 INSULATING

LEVEL 2

Curriculum Notes

- 147.5 Hours
- Updated: 1999
- A revision is under way and will be in stock in 2016; for more information visit www.nccer.org/book-updates.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-909417-0
Instructor's Guide: $97	978-0-13-909433-0

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.

Installing Flexible Foam Insulation
(32.5 Hours)

Trainee $20 ISBN 978-0-13-910167-0
Instructor $20 ISBN 978-0-13-910266-0

(Module ID 19201) Covers proper tool use and procedures for installing flexible foam insulation, including how to cut and install flexible foam insulation on pipe fittings, valves, flanges, equipment, and air ducts.

Installing Blanket Insulation for Ducts
(7.5 Hours)

Trainee $20 ISBN 978-0-13-910175-5
Instructor $20 ISBN 978-0-13-910274-5

(Module ID 19202) Covers fiberglass blanket installation to ducts and apparatus and discusses vapor-sealed blanket insulation facings.

Installing Board Insulation for Ducts *(20 Hours)*

Trainee $20 ISBN 978-0-13-910183-0
Instructor $20 ISBN 978-0-13-910282-0

(Module ID 19203) Covers fiberglass board insulation applications, such as cutting fiberglass board insulation to fit over standing seams and stiffeners, vapor-seal applications, and cutting and installing fiberglass board insulation on round or oval ducts.

Installing Calcium Silicate/Expanded Perlite Pipe Insulation *(15 Hours)*

Trainee $20 ISBN 978-0-13-910191-5
Instructor $20 ISBN 978-0-13-910290-5

(Module ID 19204) Discusses the safe handling and storage of calcium silicate pipe insulation, how to make accurate cuts, and how to install single- and double-layers of calcium silicate pipe insulation.

Installing Mineral Wool Insulation *(12.5 Hours)*

Trainee $20 ISBN 978-0-13-910209-7
Instructor $20 ISBN 978-0-13-910308-7

(Module ID 19205) 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.

Installing Rigid Foam Insulation
(20 Hours)

Trainee $20 ISBN 978-0-13-910217-2
Instructor $20 ISBN 978-0-13-910316-2

(Module ID 19206) Covers the proper use of tools; handling and storage of rigid foam insulation; measuring, cutting, installing, and sealing rigid foam plastic and cellular glass insulation; cryogenic installation; expansion joints; contraction joints; and vapor stops.

Installing Board and Block Insulation
(17.5 Hours)

Trainee $20 ISBN 978-0-13-910225-7
Instructor $20 ISBN 978-0-13-910324-7

(Module ID 19207) Covers the measuring requirements of board and block insulation; scoring, beveling, and cutting methods; and how to install board and block insulation on flat or curved surfaces and on large diameter tanks.

Cement and Fabric Finishes & Mastics *(10 Hours)*

Trainee $20 ISBN 978-0-13-910233-2
Instructor $20 ISBN 978-0-13-910332-2

(Module ID 19208) Covers the proper use of finishing tools, cleanup and protection procedures, and the limitations of cements, fabric finishes, and mastics.

Plumbing Systems *(7.5 Hours)*

Trainee $20 ISBN 978-0-13-910241-7
Instructor $20 ISBN 978-0-13-910340-7

(Module ID 19209) Covers cold and hot water plumbing systems, drainage systems in buildings, insulation requirements on plumbing systems, and piping hook-ups.

Chilled and Hot Water Heating Systems
(5 Hours)

Trainee $20 ISBN 978-0-13-910258-5
Instructor $20 ISBN 978-0-13-910357-5

(Module ID 19210) Covers chilled and hot water heating and dual-temperature systems, including the types of pipes and equipment used in various systems. Explains which systems require insulation and why.

L3 INSULATING

LEVEL 3

Curriculum Notes

- 145 Hours
- Updated: 1999

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-909458-3
Instructor's Guide: $97	978-0-13-909474-3

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.

Trade Math *(7.5 Hours)*

Trainee $20 ISBN 978-0-13-910365-0
Instructor $20 ISBN 978-0-13-910480-0

(Module ID 19301) Covers the use of measuring tools and scale rulers; describes how to make decimal, dimensional, and temperature conversions; and explains the use of formulas for calculating insulation surface areas of various objects.

Air Duct Systems *(5 Hours)*

Trainee $20 ISBN 978-0-13-910373-5
Instructor $20 ISBN 978-0-13-910498-5

(Module ID 19302) Covers the identification of various duct systems and their associated components.

Theory of Heat Transfer and Moisture Effects
(2.5 Hours)

Trainee $20 ISBN 978-0-13-910381-0
Instructor $20 ISBN 978-0-13-910506-7

(Module ID 19303) Describes methods of heat transfer and moisture migration and discusses the application of various types of insulation to slow or prevent these processes.

Adhesives and Their Uses *(2.5 Hours)*

Trainee $20 ISBN 978-0-13-910399-5
Instructor $20 ISBN 978-0-13-910514-2

(Module ID 19304) Covers the identification, application, and use of adhesives.

Steam, Condensate, and Process Water Systems *(5 Hours)*

Trainee $20 ISBN 978-0-13-910407-7
Instructor $20 ISBN 978-0-13-910522-7

(Module ID 19305) Covers the identification of steam and condensate piping and describes steam and process water systems and their components.

Large Boilers, Breechings, Precipitators, and Apparatus *(10 Hours)*

Trainee $20 ISBN 978-0-13-910415-2
Instructor $20 ISBN 978-0-13-910530-2

(Module ID 19306) Describes boilers and related equipment, and their insulation requirements.

Refrigeration and Cryogenic Systems *(2.5 Hours)*
Trainee $20 ISBN 978-0-13-910423-7
Instructor $20 ISBN 978-0-13-910548-7
(Module ID 19307) Introduces air conditioning and refrigeration systems and their insulation requirements. Also describes the special insulation requirements of extremely low-temperature cryogenic systems.

Specialized Insulation Systems *(5 Hours)*
Trainee $20 ISBN 978-0-13-910431-2
Instructor $20 ISBN 978-0-13-910555-5
(Module ID 19308) Describes special-application insulation systems, including low-temperature and prefabricated panels; refractory insulation; soft pads and pre-shaped removable covers; preinsulated systems; spray, foam, and pour-in-place insulation; fire stops; noise and sound control systems; and cryogenic applications.

Blueprints and Specifications *(12.5 Hours)*
Trainee $20 ISBN 978-0-13-910449-7
Instructor $20 ISBN 978-0-13-910563-0
(Module ID 19309) Describes how to determine the insulation requirements of a project by interpreting construction drawings. Includes a set of blueprints with the Trainee module.

Jacketing Fabrication – Piping and Fittings *(40 Hours)*
Trainee $20 ISBN 978-0-13-910456-5
Instructor $20 ISBN 978-0-13-910571-5
(Module ID 19310) Covers the identification and applications of pipes and pipe fittings and describes types of pipe and fitting jacketing, along with layout installation procedures and securements.

Jacketing Fabrication – Vessels and Equipment *(40 Hours)*
Trainee $20 ISBN 978-0-13-910464-0
Instructor $20 ISBN 978-0-13-910589-0
(Module ID 19311) Covers the identification of vessel and equipment jacketing, along with layout, fabrication, installation procedures, and securements.

Sheet Metal Lagging *(12.5 Hours)*
Trainee $20 ISBN 978-0-13-910472-5
Instructor $20 ISBN 978-0-13-910597-5
(Module ID 19312) Describes the identification and application of common sheet metal tools, discusses fabrication and installation methods, and covers flashing and sealing techniques.

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. 11 for ordering information.)
- Revised: 2006, Third Edition
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $67	978-0-13-227288-9
Instructor's Guide: $67	978-0-13-227290-2

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.

Orientation to the Trade *(5 Hours)*
Trainee $20 ISBN 978-0-13-613078-9
Instructor $20 ISBN 978-0-13-613079-6
(Module ID 15101-06) Presents the history of the trade and discusses career paths for millwrights. Describes environments and types of work associated with the millwright trade.

Millwright Hand Tools *(15 Hours)*
Trainee $20 ISBN 978-0-13-229009-8
Instructor $20 ISBN 978-0-13-229015-9
(Module ID 15102-06) Introduces hand tools used by millwrights. Explains hand tool safety and covers the methods for selecting, inspecting, using, and maintaining these tools.

Fasteners and Anchors *(10 Hours)*
Trainee $20 ISBN 978-0-13-229010-4
Instructor $20 ISBN 978-0-13-229016-6
(Module ID 15103-06) Identifies fasteners and anchors used by millwrights, including their applications and installation procedures.

Basic Layout *(20 Hours)*
Trainee $20 ISBN 978-0-13-229011-1
Instructor $20 ISBN 978-0-13-229017-3
(Module ID 15104-06) Discusses the tools used in layout. Explains how to lay out baselines using the arc method and 3-4-5 method.

Gaskets and O-Rings *(10 Hours)*
Trainee $20 ISBN 978-0-13-229012-8
Instructor $20 ISBN 978-0-13-229018-0
(Module ID 15105-06) Describes gaskets and O-rings and their applications. Provides instructions for laying out, cutting, and installing gaskets.

Oxyfuel Cutting *(15 Hours)*
Trainee $20 ISBN 978-0-13-229013-5
Instructor $20 ISBN 978-0-13-229019-7
(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
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-227292-6
Instructor's Guide: $97	978-0-13-228589-6

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.

Intermediate Trade Math *(20 Hours)*
Trainee $20 ISBN 978-0-13-614641-4
Instructor $20 ISBN 978-0-13-614651-3
(Module ID 15201-07) Explains how to use tables of equivalents and conversion tables, figure ratios and proportions, perform right angle trigonometry, calculate take-outs using trigonometry, and calculate volumes and weights of objects.

Field Sketching *(10 Hours)*
Trainee $20 ISBN 978-0-13-614642-1
Instructor $20 ISBN 978-0-13-614653-7
(Module ID 15202-07) Teaches the basic skills needed to make a good field sketch to convey information about how parts should be made or assembled.

Intermediate Blueprint Reading *(20 Hours)*
Trainee $20 ISBN 978-0-13-614643-8
Instructor $20 ISBN 978-0-13-614654-4
(Module ID 15203-07) Explains orthographic projection, isometric, and schematic drawings used to show piping, hydraulic, and pneumatic systems.

Specialty Tools *(10 Hours)*
Trainee $20 ISBN 978-0-13-614644-5
Instructor $20 ISBN 978-0-13-614655-1
(Module ID 15204-07) Explains how to select, inspect, and maintain torque multipliers, cable cutters, nut splitters, keyseat rules, zero-to-one micrometers, and various gauges.

Millwright Power Tools *(20 Hours)*
Trainee $20 ISBN 978-0-13-614646-9
Instructor $20 ISBN 978-0-13-614656-8
(Module ID 15205-07) Introduces power tools used by millwrights and procedures for using, caring for, and maintaining these tools.

Rigging *(20 Hours)*
Trainee $20 ISBN 978-0-13-614647-6
Instructor $20 ISBN 978-0-13-614657-5
(Module ID 15206-07) Explains how to select, inspect and use rigging equipment, how to determine requirements and plan lifts, and how to communicate with crane operators.

Setting Baseplates and Soleplates *(15 Hours)*

Trainee $20 **ISBN 978-0-13-614648-3**
Instructor $20 **ISBN 978-0-13-614658-2**
(Module ID 15207-07) Explains procedures for setting machine baseplates and soleplates, and aligning them with other equipment.

Lubrication *(20 Hours)*

Trainee $20 **ISBN 978-0-13-614649-0**
Instructor $20 **ISBN 978-0-13-614659-9**
(Module ID 15208-07) Explains how to safely select and use lubricants. Describes types of lubricants and lubrication devices.

Introduction to Bearings *(15 Hours)*

Trainee $20 **ISBN 978-0-13-614650-6**
Instructor $20 **ISBN 978-0-13-614661-2**
(Module ID 15209-07) Describes the types and applications of bearings, including plain, roller, ball, thrust and guide bearings, as well as pillow block, flanged, and takeup bearings. Also explains bearing designation systems.

L3 MILLWRIGHT

LEVEL 3

Curriculum Notes

- 160 Hours
- Revised: 2008, Third Edition
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-614431-1
Instructor's Guide: $97	978-0-13-614432-8

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.

Advanced Trade Math *(20 Hours)*

Trainee $20 **ISBN 978-0-13-604759-9**
Instructor $20 **ISBN 978-0-13-604772-8**
(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 *(20 Hours)*

Trainee $20 **ISBN 978-0-13-604725-4**
Instructor $20 **ISBN 978-0-13-604773-5**
(Module ID 15302-08) Explains how to select, inspect, use and care for levels, calipers, micrometers, height gauges and surface plates, dial indicators, protractors, parallels and gauge blocks, trammels, and pyrometers.

Installing Packing *(10 Hours)*

Trainee $20 **ISBN 978-0-13-604732-2**
Instructor $20 **ISBN 978-0-13-604780-3**
(Module ID 15303-08) Explains the types of packing and packing materials found in a typical stuffing box. Covers how to remove packing and how to install compression packing and lip-type packing.

Installing Seals *(5 Hours)*

Trainee $20 **ISBN 978-0-13-604727-8**
Instructor $20 **ISBN 978-0-13-604775-9**
(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 *(20 Hours)*

Trainee $20 **ISBN 978-0-13-604733-9**
Instructor $20 **ISBN 978-0-13-604781-0**
(Module ID 15305-08) Covers the function and advantages of mechanical seals, identifies parts and types of seals, and includes procedures for removing, inspecting, and installing mechanical seals.

Removing and Installing Bearings *(20 Hours)*

Trainee $20 **ISBN 978-0-13-604726-1**
Instructor $20 **ISBN 978-0-13-604774-2**
(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)*

Trainee $20 **ISBN 978-0-13-604728-5**
Instructor $20 **ISBN 978-0-13-604776-6**
(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)*

Trainee $20 **ISBN 978-0-13-604731-5**
Instructor $20 **ISBN 978-0-13-604779-7**
(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)*

Trainee $20 **ISBN 978-0-13-604769-8**
Instructor $20 **ISBN 978-0-13-604782-7**
(Module ID 15309-08) Explains the applications and fabrication procedures for angle iron, chain, complex reverse-indicator, Christmas tree, and piano wire jigs.

Prealignment for Equipment Installation *(15 Hours)*

Trainee $20 **ISBN 978-0-13-604730-8**
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)*

Trainee $20 **ISBN 978-0-13-604770-4**
Instructor $20 **ISBN 978-0-13-604783-4**
(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)*

Trainee $20 **ISBN 978-0-13-604771-1**
Instructor $20 **ISBN 978-0-13-604784-1**
(Module ID 15312-08) Explains how to install axial-flow fans, centrifugal fans, and roots-type and screw-type blowers.

L4 MILLWRIGHT

LEVEL 4

Curriculum Notes

- 150 Hours
- Revised: 2008, Third Edition
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

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

Conveyors *(5 Hours)*

Trainee $20 **ISBN 978-0-13-610431-5**
Instructor $20 **ISBN 978-0-13-610479-7**
(Module ID 15401-08) Describes conveyor systems and their principles of operation.

Troubleshooting and Repairing Conveyors *(12.5 Hours)*

Trainee $20 **ISBN 978-0-13-610432-2**
Instructor $20 **ISBN 978-0-13-610480-3**
(Module ID 15402-08) Describes maintaining and repairing belt, roller, chain, screw, and pneumatic conveyors.

Conventional Alignment *(30 Hours)*

Trainee $20 **ISBN 978-0-13-610433-9**
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)*

Trainee $20 **ISBN 978-0-13-610434-6**
Instructor $20 **ISBN 978-0-13-610482-7**
(Module ID 15404-08) Describes common pumps and their principles of operation. Explains centrifugal, rotary, reciprocating and metering pumps. Describes net positive suction head and cavitation.

Troubleshooting and Repairing Pumps *(7.5 Hours)*

Trainee $20 **ISBN 978-0-13-610435-3**
Instructor $20 **ISBN 978-0-13-610483-4**
(Module ID 15405-08) Describes inspecting, troubleshooting, assembling, and disassembling pumps. Explains installing pumps, and preparing them for startup. Discusses shutdown, repair, and removal of pumps from the system.

Compressors and Compressor Maintenance *(20 Hours)*

Trainee $20 **ISBN 978-0-13-610437-7**
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)*

Trainee $20 **ISBN 978-0-13-610438-4**
Instructor $20 **ISBN 978-0-13-610485-8**
(Module ID 15407-08) Explains pneumatic system components and compressed-air treatment. Introduces equipment auxiliary and special-application equipment used with compressors and with tools.

Troubleshooting and Repairing Pneumatic Equipment *(10 Hours)*

Trainee $20 **ISBN 978-0-13-610474-2**
Instructor $20 **ISBN 978-0-13-610487-2**
(Module ID 15408-08) Explains repair and maintenance of pneumatic system components. Describes troubleshooting processes and methods, including pressure sensors and flow sensors.

Basic Hydraulic Systems *(10 Hours)*

Trainee $20 ISBN 978-0-13-610475-9
Instructor $20 ISBN 978-0-13-610488-9

(Module ID 15409-08) Describes principles and types of hydraulic equipment and related safety procedures. Describes applications of hydraulic equipment.

Troubleshooting and Repairing Hydraulic Equipment *(7.5 Hours)*

Trainee $20 ISBN 978-0-13-610476-6
Instructor $20 ISBN 978-0-13-610489-6

(Module ID 15410-08) Explains inspecting hydraulic systems, diagnosing problems, and repairing these systems. Shows how to read hydraulic schematic symbols.

Troubleshooting and Repairing Gearboxes *(20 Hours)*

Trainee $20 ISBN 978-0-13-610477-3
Instructor $20 ISBN 978-0-13-610490-2

(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

LEVEL 5

Curriculum Notes

- 165 Hours
- Revised: 2009, Third Edition
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-609960-4
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)*

Trainee $20 ISBN 978-0-13-610491-9
Instructor $20 ISBN 978-0-13-610466-7

(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 measurements.

Laser Alignment *(25 Hours)*

Trainee $20 ISBN 978-0-13-610492-6
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.

Advanced Blueprint Reading *(25 Hours)*

Trainee $20 ISBN 978-0-13-610494-0
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.

Optical Alignment *(25 Hours)*

Trainee $20 ISBN 978-0-13-610495-7
Instructor $20 ISBN 978-0-13-610470-4

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

Turbines *(20 Hours)*

Trainee $20 ISBN 978-0-13-610496-4
Instructor $20 ISBN 978-0-13-610471-1

(Module ID 15505-09) Describes types of turbines and their components. Describes the operation and common applications of particular types, including gas, steam, and water turbines.

Maintaining and Repairing Turbine Components *(15 Hours)*

Trainee $20 ISBN 978-0-13-610497-1
Instructor $20 ISBN 978-0-13-610472-8

(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 ISBN 978-0-13-610498-8
Instructor $20 ISBN 978-0-13-610473-5

(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 ISBN 978-0-13-610499-5
Instructor $20 ISBN 978-0-13-610509-1

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

Vibration Analysis *(5 Hours)*

Trainee $20 ISBN 978-0-13-610465-0
Instructor $20 ISBN 978-0-13-610510-7

(Module ID 15509-09) Explains the causes of vibration and the procedures and types of equipment used in vibration analysis. Describes the equipment used for vibration testing and monitoring. Describes field machine balancing.

Painting

L1 PAINTING - COMMERCIAL & RESIDENTIAL

LEVEL 1

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. 11 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 and Instructor Guide(s) listed above. The following ISBN and pricing information is for ordering individual modules only.

Careers in the Painting Trade *(5 Hours)*

Trainee $20 ISBN 978-0-13-874249-2
Instructor $20 ISBN 978-0-13-874256-0

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

Safety *(10 Hours)*

Trainee $20 ISBN 978-0-13-874223-2
Instructor $20 ISBN 978-0-13-874231-7

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

Ladders, Scaffolds, Lifts, and Fall Protection *(10 Hours)*

Trainee $20 ISBN 978-0-13-793142-2
Instructor $20 ISBN 978-0-13-793159-0

(Module ID 07103) Covers methods of erecting, using and maintaining ladders, scaffolds, and lifts. Discusses fall protection equipment and safety practices used when working on ladders, scaffolds, and lifts.

Identifying Surface/Substrate Materials and Conditions *(5 Hours)*

Trainee $20 ISBN 978-0-13-874348-2
Instructor $20 ISBN 978-0-13-874355-0

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

Protecting Adjacent Surfaces *(5 Hours)*

Trainee $20 ISBN 978-0-13-874389-5
Instructor $20 ISBN 978-0-13-874397-0

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

Basic Surface Preparation *(15 Hours)*

Trainee $20 ISBN 978-0-13-793167-5
Instructor $20 ISBN 978-0-13-793175-0

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

Sealants and Repair/Fillers *(5 Hours)*

Trainee $20 ISBN 978-0-13-793183-5
Instructor $20 ISBN 978-0-13-793191-0

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

Introduction to Paints and Coatings *(10 Hours)*

Trainee $20 ISBN 978-0-13-793209-2
Instructor $20 ISBN 978-0-13-793217-7

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

Brushing and Rolling Paints and Coatings *(15 Hours)*

Trainee $20 ISBN 978-0-13-874462-5
Instructor $20 ISBN 978-0-13-874470-0

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

L2 PAINTING - COMMERCIAL & RESIDENTIAL

LEVEL 2

Curriculum Notes

- 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 and Instructor Guide(s) listed above. The following ISBN and pricing information is for ordering individual modules only.

Painting Failures and Remedies *(7.5 Hours)*

Trainee $20 ISBN 978-0-13-874702-2
Instructor $20 ISBN 978-0-13-874710-7

(Module ID 07201) Describes failures of paints/coatings on exterior and interior substrates, causes of these failures, and their remedies. Focuses on the nature of the substrates, application procedures, and surface preparation.

Job Planning and Completion *(10 Hours)*

Trainee $20 ISBN 978-0-13-874561-5
Instructor $20 ISBN 978-0-13-874579-0

(Module ID 07202) Explains the process for estimating a job to submit a bid. Also covers the processes for planning and accomplishing a job from start to finish with emphasis placed on the importance and use of drawings, specifications, schedules, and other instructions.

Chemical Cleaning and Stripping *(7.5 Hours)*

Trainee $20 ISBN 978-0-13-874645-2
Instructor $20 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)*

Trainee $20 ISBN 978-0-13-874629-2
Instructor $20 ISBN 978-0-13-874637-7

(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)*

Trainee $20 ISBN 978-0-13-874785-5
Instructor $20 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 $20 ISBN 978-0-13-874744-2
Instructor $20 ISBN 978-0-13-874751-0

(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)*

Trainee $20 ISBN 978-0-13-874587-5
Instructor $20 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)*

Trainee $20 ISBN 978-0-13-874686-5
Instructor $20 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)*

Trainee $20 ISBN 978-0-13-874769-5
Instructor $20 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)*

Trainee $20 ISBN 978-0-13-874603-2
Instructor $20 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) (32.5 Hours)*

Trainee $20 ISBN 978-0-13-874660-5
Instructor $20 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.

L3 PAINTING - COMMERCIAL & RESIDENTIAL

LEVEL 3

Curriculum Notes

- 152.5 Hours
- Revised: 1998

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-949041-5
Instructor's Guide: $97	978-0-13-949066-8

MODULES

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

Painting Failures and Remedies Two *(7.5 Hours)*

Trainee $20 ISBN 978-0-13-874900-2
Instructor $20 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)*

Trainee $20 ISBN 978-0-13-874827-2
Instructor $20 ISBN 978-0-13-874835-7

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

Coatings Three *(15 Hours)*

Trainee $20 ISBN 978-0-13-875105-0
Instructor $20 ISBN 978-0-13-875113-5

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

Color and Tinting *(10 Hours)*

Trainee $20 ISBN 978-0-13-874868-5
Instructor $20 ISBN 978-0-13-874876-0

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

Decorative (Faux) Finishes *(22.5 Hours)*

Trainee $20 ISBN 978-0-13-875121-0
Instructor $20 ISBN 978-0-13-875139-5

(Module ID 07305) Describes techniques for glazing, antiquing, stippling, mottling, gilding, marbling, and graining decorative finishes.

Wallcovering *(40 Hours)*

Trainee $20 ISBN 978-0-13-874926-2
Instructor $20 ISBN 978-0-13-874934-7

(Module ID 07306) Covers the wallcovering process from start to finish. Includes equipment and materials, estimating methods, surface preparation, adhesives and installation, and failures and remedies.

Graphics *(12.5 Hours)*

Trainee $20 ISBN 978-0-13-874967-5
Instructor $20 ISBN 978-0-13-874975-0

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

Texturing *(10 Hours)*
Trainee $20 ISBN 978-0-13-875063-3
Instructor $20 ISBN 978-0-13-875071-8
(Module ID 07308) Explains the characteristics of various texturing materials, surface preparation procedures, and techniques for producing different patterns.

Spraying with Special Devices *(20 Hours)*
Trainee $20 ISBN 978-0-13-874884-5
Instructor $20 ISBN 978-0-13-874892-0
(Module ID 07309) Covers the design and function of texture, cold roof coating, electrostatic, and plural component spraying equipment. Includes procedures for the safe operation and maintenance of typical equipment.

The Painting Level 4 curriculum has been discontinued. The Industrial Coating and Application Specialist curriculum may be used instead. See p. 30.

Pipefitting

L1 PIPEFITTING

LEVEL 1

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. 11 for ordering information.)
- Revised: 2006, Third Edition
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.
- 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 ISBN 978-0-13-229020-3
Instructor $20 ISBN 978-0-13-229027-2
(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 ISBN 978-0-13-229021-0
Instructor $20 ISBN 978-0-13-229028-9
(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 ISBN 978-0-13-229023-4
Instructor $20 ISBN 978-0-13-229029-6
(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 ISBN 978-0-13-229024-1
Instructor $20 ISBN 978-0-13-229031-9
(Module ID 08104-06) Explains the safety requirements for oxyfuel cutting. Identifies oxyfuel cutting equipment and provides instructions for setting up, lighting, and using the equipment. Explains how to perform straight line cutting, piercing, beveling, washing, and gouging.

Ladders and Scaffolds *(12.5 Hours)*
Trainee $20 ISBN 978-0-13-229025-8
Instructor $20 ISBN 978-0-13-229032-6
(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.

Motorized Equipment *(10 Hours)*
Trainee $20 ISBN 978-0-13-229026-5
Instructor $20 ISBN 978-0-13-229033-3
(Module ID 08106-06) Explains the safety factors, operator maintenance, and operating procedures associated with motorized equipment used on job sites, including electrical generators, air compressors, aerial lifts, pumps, forklifts, and hydraulic cranes.

L2 PIPEFITTING

LEVEL 2

Curriculum Notes

- 162.5 Hours
- Revised: 2006, Third Edition
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-227314-5
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 ISBN 978-0-13-613595-1
Instructor $20 ISBN 978-0-13-613606-4
(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 ISBN 978-0-13-613596-8
Instructor $20 ISBN 978-0-13-613607-1
(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 ISBN 978-0-13-613598-2
Instructor $20 ISBN 978-0-13-613608-8
(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 ISBN 978-0-13-613599-9
Instructor $20 ISBN 978-0-13-613609-5
(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 ISBN 978-0-13-613600-2
Instructor $20 ISBN 978-0-13-613610-1
(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 ISBN 978-0-13-613601-9
Instructor $20 ISBN 978-0-13-613611-8
(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 ISBN 978-0-13-613602-6
Instructor $20 ISBN 978-0-13-613612-5
(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 ISBN 978-0-13-613603-3
Instructor $20 ISBN 978-0-13-613614-9
(Module ID 08208-06) Explains the use of shoring materials per OSHA standards. Covers shoring systems, installing a hydraulic vertical shore, determining the overall fall of a sewer line, setting the grade and elevation of a trench, and backfilling.

Underground Pipe Installation *(20 Hours)*

Trainee $20 **ISBN 978-0-13-613604-0**
Instructor $20 **ISBN 978-0-13-613580-7**

(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

LEVEL 3

Curriculum Notes

- 150 Hours
- Revised: 2007, Third Edition
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-227284-1
Instructor's Guide: $97	978-0-13-227286-5

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.

Rigging Equipment *(10 Hours)*

Trainee $20 **ISBN 978-0-13-614662-9**
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)*

Trainee $20 **ISBN 978-0-13-614663-6**
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 *(10 Hours)*

Trainee $20 **ISBN 978-0-13-614664-3**
Instructor $20 **ISBN 978-0-13-614674-2**

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

Advanced Trade Math *(25 Hours)*

Trainee $20 **ISBN 978-0-13-614630-8**
Instructor $20 **ISBN 978-0-13-614675-9**

(Module ID 08304-07) Discusses the use of equivalent and conversion tables. Explains how to use right angle trigonometry to calculate take-outs.

Motorized Equipment Two *(10 Hours)*

Trainee $20 **ISBN 978-0-13-614631-5**
Instructor $20 **ISBN 978-0-13-614676-6**

(Module ID 08305-07) Covers the applications and safety requirements of drain cleaners, personnel lifts, and cable lifts.

Introduction to Aboveground Pipe Installation *(20 Hours)*

Trainee $20 **ISBN 978-0-13-614632-2**
Instructor $20 **ISBN 978-0-13-614677-3**

(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 *(15 Hours)*

Trainee $20 **ISBN 978-0-13-614633-9**
Instructor $20 **ISBN 978-0-13-614679-7**

(Module ID 08307-07) Explains how to secure the work area and determine field run specifications, load weights for erection equipment, and support needs. Describes how to erect vessel trim.

Pipe Hangers and Supports *(25 Hours)*

Trainee $20 **ISBN 978-0-13-614634-6**
Instructor $20 **ISBN 978-0-13-614680-3**

(Module ID 08308-07) Explains how to identify, select, and install pipe hangers and supports, including spring can supports.

Testing Piping Systems and Equipment *(20 Hours)*

Trainee $20 **ISBN 978-0-13-614635-3**
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
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-614429-8
Instructor's Guide: $97	978-0-13-614430-4

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.

Advanced Blueprint Reading *(50 Hours)*

Trainee $20 **ISBN 978-0-13-604786-5**
Instructor $20 **ISBN 978-0-13-604762-9**

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

Advanced Pipe Fabrication *(50 Hours)*

Trainee $20 **ISBN 978-0-13-604787-2**
Instructor $20 **ISBN 978-0-13-604763-6**

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

Stress Relieving and Aligning *(10 Hours)*

Trainee $20 **ISBN 978-0-13-604788-9**
Instructor $20 **ISBN 978-0-13-604764-3**

(Module ID 08403-07) Explains the nature of misalignment and methods of correcting it. Includes terminology that will help pipefitters communicate with millwrights who perform pump setup.

Steam Traps *(10 Hours)*

Trainee $20 **ISBN 978-0-13-604789-6**
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)*

Trainee $20 **ISBN 978-0-13-604790-2**
Instructor $20 **ISBN 978-0-13-604766-7**

(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)*

Trainee $20 **ISBN 978-0-13-604791-9**
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)*

Trainee $20 **ISBN 978-0-13-604792-6**
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**
Instructor $20 **ISBN 978-0-13-604804-6**

(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)*

Trainee $20 **ISBN 978-0-13-604761-2**
Instructor $20 **ISBN 978-0-13-604805-3**

(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

L1 PIPELAYER

LEVEL 1

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. 11 for ordering information.)
- Published: 1999
- Instructor's Guide includes access code to download TestGen software, module exams, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $67	978-0-13-014258-0
Instructor's Guide: $67	978-0-13-014250-4

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.

Job Site Safety *(17.5 Hours)*

Trainee $20 ISBN 978-0-13-015304-3
Instructor $20 ISBN 978-0-13-015315-9
(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 ISBN 978-0-13-015305-0
Instructor $20 ISBN 978-0-13-015316-6
(Module ID 24102) Describes the safe use, care, and maintenance of pipelayer hand and power tools. Discusses methods for operating and maintaining dewatering equipment, generators, and compressors. Contains an introduction to drilling and tapping machines.

Rigging and Delivering Pipe and Associated Structures *(7.5 Hours)*

Trainee $20 ISBN 978-0-13-015307-4
Instructor $20 ISBN 978-0-13-015317-3
(Module ID 24103) Describes 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 ISBN 978-0-13-015308-1
Instructor $20 ISBN 978-0-13-015318-0
(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 ISBN 978-0-13-015309-8
Instructor $20 ISBN 978-0-13-015319-7
(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 ISBN 978-0-13-015300-5
Instructor $20 ISBN 978-0-13-015310-4
(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 ISBN 978-0-13-015311-1
Instructor $20 ISBN 978-0-13-015321-0
(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 ISBN 978-0-13-015312-8
Instructor $20 ISBN 978-0-13-015323-4
(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 ISBN 978-0-13-015313-5
Instructor $20 ISBN 978-0-13-015324-1
(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.

Plumbing

L1 PLUMBING

LEVEL 1

Curriculum Notes

- 217.5 Hours (Includes 72.5 hours of *Core Curriculum,* which is a prerequisite for completion and must be purchased separately. See p. 11 for ordering information.)
- Revised: 2012, Fourth Edition
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $67	978-0-13-292143-5
Instructor's Guide: $67	978-0-13-292163-3
NCCERconnect Access Card: $67	978-0-13-422664-4
NCCERconnect + Trainee Guide: $92	978-0-13-427457-7

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 the Plumbing Profession *(5 Hours)*

Trainee $20 ISBN 978-0-13-292320-0
Instructor $20 ISBN 978-0-13-292333-0
(Module ID 02101-12) Introduces trainees to career options in the plumbing profession. Provides a history of plumbing and also discusses the current technology, industries, and associations of the plumbing profession. Reviews human relations and safety skills.

Plumbing Safety *(22.5 Hours)*

Trainee $20 ISBN 978-0-13-292321-7
Instructor $20 ISBN 978-0-13-292334-7
(Module ID 02102-12) Discusses the causes of accidents and their consequences including delays, increased expenses, injury, and loss of life. Reviews the types and proper use of personal protective equipment (PPE). Explains the use of critical safety information including HazCom, safety signs, signals, lockout/tagout, and emergency response. Covers confined-space safety, and reviews safety issues related to hand and power tools.

Tools of the Plumbing Trade *(10 Hours)*

Trainee $20 ISBN 978-0-13-292322-4
Instructor $20 ISBN 978-0-13-292336-1
(Module ID 02103-12) Describes the care and use of hand and power tools trainees will use on the job. Explains how to select the appropriate tools for different tasks, and reviews tool maintenance and safety issues.

Introduction to Plumbing Math *(12.5 Hours)*

Trainee $20 ISBN 978-0-13-292323-1
Instructor $20 ISBN 978-0-13-292337-8
(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 ISBN 978-0-13-292324-8
Instructor $20 ISBN 978-0-13-292338-5
(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)*

Trainee $20 **ISBN 978-0-13-292325-5**
Instructor $20 **ISBN 978-0-13-292339-2**

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

Copper Tube and Fittings *(12.5 Hours)*

Trainee $20 **ISBN 978-0-13-292327-9**
Instructor $20 **ISBN 978-0-13-292340-8**

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

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

Trainee $20 **ISBN 978-0-13-292328-6**
Instructor $20 **ISBN 978-0-13-292341-5**

(Module ID 02108-12) Introduces hub-and-spigot and no-hub cast-iron pipe and fittings and their applications in DWV systems. Reviews material properties, storage and handling requirements, and fittings and valves. Covers joining methods, installation, and testing.

Carbon Steel Pipe and Fittings *(12.5 Hours)*

Trainee $20 **ISBN 978-0-13-292329-3**
Instructor $20 **ISBN 978-0-13-292342-2**

(Module ID 02109-12) Discusses threading, labeling, and sizing of steel pipe and reviews the differences between domestic and imported pipe. Covers the proper techniques for measuring, cutting, threading, joining, and hanging steel pipe. Also reviews corrugated stainless steel tubing.

Introduction to Plumbing Fixtures *(7.5 Hours)*

Trainee $20 **ISBN 978-0-13-292330-9**
Instructor $20 **ISBN 978-0-13-292344-6**

(Module ID 02110-12) Discusses the proper applications of code-approved fixtures in plumbing installations. Reviews the different types of fixtures and the materials used in them. Covers storage, handling, and code requirements.

Introduction to Drain, Waste, and Vent (DWV) Systems *(10 Hours)*

Trainee $20 **ISBN 978-0-13-292331-6**
Instructor $20 **ISBN 978-0-13-292345-3**

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

Introduction to Water Distribution Systems *(10 Hours)*

Trainee $20 **ISBN 978-0-13-292332-3**
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.

L2 PLUMBING

LEVEL 2

Curriculum Notes

- 170 Hours
- Revised: 2013, Fourth Edition
- New printed Instructor's Package includes lesson plans and instructor's copy of Trainee Guide with an access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-314850-3
Instructor's Package: $97	978-0-13-414123-7
NCCERconnect Access Card: $97	978-0-13-422666-8
NCCERconnect + Trainee Guide: $122	978-0-13-427458-4

MODULES

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

Plumbing Math Two *(15 Hours)*

Trainee $20 **ISBN 978-0-13-340275-9**
Instructor $20 **ISBN 978-0-13-340287-2**

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

Reading Commercial Drawings *(25 Hours)*

Trainee $20 **ISBN 978-0-13-340276-6**
Instructor $20 **ISBN 978-0-13-340288-9**

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

Structural Penetrations, Insulation, and Fire-Stopping *(15 Hours)*

Trainee $20 **ISBN 978-0-13-340277-3**
Instructor $20 **ISBN 978-0-13-340289-6**

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

Installing and Testing DWV Piping *(30 Hours)*

Trainee $20 **ISBN 978-0-13-340278-0**
Instructor $20 **ISBN 978-0-13-340291-9**

(Module ID 02204-13) Explains how to locate, install, connect, and test a complete drain, waste, and vent (DWV) system. Discusses how to develop material takeoffs, set up and use levels, locate building sewers and building drains, locate fixtures, and test a DWV system.

Installing Roof, Floor, and Area Drains *(5 Hours)*

Trainee $20 **ISBN 978-0-13-340279-7**
Instructor $20 **ISBN 978-0-13-340292-6**

(Module ID 02205-13) Covers the proper techniques for locating, installing, and connecting roof, floor, and area drains and floor sinks according to code. Discusses waterproof membranes and flashing, drain components, shower pans, trap primers, and proper drain applications.

Installing and Testing Water Supply Piping *(20 Hours)*

Trainee $20 **ISBN 978-0-13-340280-3**
Instructor $20 **ISBN 978-0-13-340293-3**

(Module ID 02206-13) Explores the proper techniques for locating, installing, and testing complete water service and distribution systems, including meters, water heaters, water softeners, and hose bibbs. Introduces basic backflow and water hammer prevention, and discusses the installation of shower and tub valves, ice maker and washing machine boxes, and pipe stubouts and supports.

Types of Valves *(5 Hours)*

Trainee $20 **ISBN 978-0-13-340281-0**
Instructor $20 **ISBN 978-0-13-340294-0**

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

Installing Fixtures and Valves *(20 Hours)*

Trainee $20 **ISBN 978-0-13-340283-4**
Instructor $20 **ISBN 978-0-13-340295-7**

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

Installing Water Heaters *(10 Hours)*

Trainee $20 **ISBN 978-0-13-340284-1**
Instructor $20 **ISBN 978-0-13-340296-4**

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

Basic Electricity *(10 Hours)*

Trainee $20 **ISBN 978-0-13-340285-8**
Instructor $20 **ISBN 978-0-13-340297-1**

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

Fuel Gas and Fuel Oil Systems *(20 Hours)*

Trainee $20 **ISBN 978-0-13-340286-5**
Instructor $20 **ISBN 978-0-13-340298-8**

(Module ID 02211-13) Introduces techniques for safe handling of natural gas, liquefied petroleum gas, and fuel oil. Reviews fuel gas and fuel oil safety precautions and potential hazards, applications, systems installation, and testing.

L3 PLUMBING

LEVEL 3

Curriculum Notes

- 160 Hours
- Revised: 2014, Fourth Edition
- New printed Instructor's Package includes lesson plans and instructor's copy of Trainee Guide with an access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-340424-1
Instructor's Package: $97	978-0-13-414122-0
NCCERconnect Access Card: $97	978-0-13-422670-5
NCCERconnect + Trainee Guide: $122	978-0-13-427914-5

MODULES

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

Applied Math *(17.5 Hours)*

Trainee $20 ISBN 978-0-13-378271-4
Instructor $20 ISBN 978-0-13-378283-7
(Module ID 02301-14) Reviews math concepts, including weights and measures, area and volume, temperature, pressure, and force. Describes the six simple machines: inclined planes, levers, pulleys, wedges, screws, and wheels and axles.

Sizing and Protecting the Water Supply System *(30 Hours)*

Trainee $20 ISBN 978-0-13-378272-1
Instructor $20 ISBN 978-0-13-378280-6
(Module ID 02312-14) Teaches techniques for sizing water supply systems, including calculating system requirements and demand, developed lengths, and pressure drops. Reviews the factors that can reduce efficiency of water supply piping. Introduces different backflow prevention devices and explains how they work, where they are used, and how they are installed in water supply systems.

Potable Water Supply Treatment *(15 Hours)*

Trainee $20 ISBN 978-0-13-378273-8
Instructor $20 ISBN 978-0-13-378281-3
(Module ID 02303-14) Explains how to disinfect, filter, and soften water supply systems. Discusses how to troubleshoot water supply problems, flush out visible contaminants from a plumbing system, and disinfect a potable water plumbing system.

Types of Venting *(20 Hours)*

Trainee $20 ISBN 978-0-13-378275-2
Instructor $20 ISBN 978-0-13-378285-1
(Module ID 02305-14) Reviews the different types of vents that can be installed in a DWV system and explains how they work. Teaches design and installation techniques.

Sizing DWV and Storm Systems *(20 Hours)*

Trainee $20 ISBN 978-0-13-378433-9
Instructor $20 ISBN 978-0-13-378430-5
(Module ID 02306-14) Explains how to calculate drainage fixture units for waste systems. Reviews how to size drain, waste, and vent (DWV) systems; storm drainage systems; and roof storage and drainage systems.

Sewage Pumps and Sump Pumps *(12.5 Hours)*

Trainee $20 ISBN 978-0-13-378276-9
Instructor $20 ISBN 978-0-13-378286-8
(Module ID 02307-14) Discusses the installation, diagnosis, and repair of pumps, controls, and sumps in sewage and storm water removal systems.

Corrosive-Resistant Waste Piping *(7.5 Hours)*

Trainee $20 ISBN 978-0-13-378277-6
Instructor $20 ISBN 978-0-13-378287-5
(Module ID 02308-14) Discusses corrosive wastes and reviews related safety issues and hazard communications. Explains how to determine when corrosive-resistant waste piping needs to be installed, as well as how to correctly select and properly connect different types of piping.

Compressed Air *(10 Hours)*

Trainee $20 ISBN 978-0-13-378278-3
Instructor $20 ISBN 978-0-13-378288-2
(Module ID 02309-14) Explains the principles of compressed air systems and describes their components and accessories. Reviews installation and periodic servicing of air compressor systems.

Service Plumbing *(27.5 Hours)*

Trainee $20 ISBN 978-0-13-378279-0
Instructor $20 ISBN 978-0-13-378289-9
(Module ID 02311-14) Covers the troubleshooting and repair of fixtures, valves, and faucets in accordance with code and safety guidelines. Explains how to diagnose and repair water supply and drainage piping, water heaters, and other appliances and fixtures. Describes the effects of corrosion, freezing, and hard water on plumbing systems.

L4 PLUMBING

LEVEL 4

Curriculum Notes

- 145 Hours
- Revised: 2014, Fourth Edition
- New printed Instructor's Package includes lesson plans and instructor's copy of Trainee Guide with an access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-382422-3
Instructor's Package: $97	978-0-13-417727-4
NCCERconnect Access Card: $97	978-0-13-422667-5
NCCERconnect + Trainee Guide: $122	978-0-13-427913-8

MODULES

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

Business Principles for Plumbers *(15 Hours)*

Trainee $20 ISBN 978-0-13-378599-9
Instructor $20 ISBN 978-0-13-378645-3
(Module ID 02401-14) Introduces concepts and practices that are essential for competitive, successful plumbing businesses. Also covers basic business accounting and project estimating, as well as techniques for cost control and task organization.

Fundamentals of Crew Leadership *(20 Hours)*

(Module ID 46101-11; see p. 69)
Trainee $43 ISBN 978-0-13-378601-9
Instructor $43 ISBN 978-0-13-378649-1

Water Pressure Booster and Recirculation Systems *(12.5 Hours)*

Trainee $20 ISBN 978-0-13-378602-6
Instructor $20 ISBN 978-0-13-378651-4
(Module ID 02403-14) Builds on trainees' previous experience with pumps, storage tanks, controls, and pipes and fittings by teaching how to assemble those components into systems that boost water pressure and provide hot water.

Indirect and Special Waste *(17.5 Hours)*

Trainee $20 ISBN 978-0-13-378603-3
Instructor $20 ISBN 978-0-13-378655-2
(Module ID 02404-14) Describes the code requirements and installation procedures for systems that protect against contamination from indirect and special waste.

Hydronic and Solar Heating Systems *(17.5 Hours)*

Trainee $20 ISBN 978-0-13-378605-7
Instructor $20 ISBN 978-0-13-378658-3
(Module ID 02405-14) Introduces the basic types of hydronic and solar heating systems and their components. Reviews hydronic and solar heating system layout, installation, testing, and balancing, and also discusses methods that inhibit corrosion in hydronic or solar heating systems.

Codes *(12.5 Hours)*

Trainee $20 ISBN 978-0-13-378606-4
Instructor $20 ISBN 978-0-13-378659-0
(Module ID 02406-14) Discusses the different codes used by plumbers across the country and explains how those codes are written, adopted, modified, and implemented.

Private Water Supply Well Systems *(10 Hours)*

Trainee $20 ISBN 978-0-13-378611-8
Instructor $20 ISBN 978-0-13-378660-6
(Module ID 02408-14) Describes the operation of pumps and well components. Reviews the qualities of good wells and how to assemble and disassemble pumps and components.

Private Waste-Disposal Systems *(10 Hours)*

Trainee $20 ISBN 978-0-13-378635-4
Instructor $20 ISBN 978-0-13-378661-3
(Module ID 02409-14) Describes the types of private waste-disposal systems, discusses the maintenance and installation of these systems, and explains how to determine the local code requirements for these systems. Covers percolation tests and sewage system planning and layout.

Swimming Pools and Hot Tubs *(7.5 Hours)*

Trainee $20 ISBN 978-0-13-378637-8
Instructor $20 ISBN 978-0-13-378663-7
(Module ID 02410-14) Introduces trainees to plumbing systems in swimming pools, hot tubs, and spas.

Plumbing for Mobile Homes and Travel Trailer Parks *(7.5 Hours)*

Trainee $20 ISBN 978-0-13-378641-5
Instructor $20 ISBN 978-0-13-378664-4
(Module ID 02411-14) Describes the location and layout of plumbing systems for mobile home and travel trailer parks. Reviews how to design and lay out a system, how to connect water and sewer lines to a mobile home, and how to estimate materials for the park.

Introduction to Medical Gas and Vacuum Systems *(15 Hours)*

Trainee $20 ISBN 978-0-13-409858-6
Instructor $20 ISBN 978-0-13-409859-3
(Module ID 02412-14) Introduces the various types of medical gas and vacuum systems used in health care facilities. Covers the system requirements and professional qualifications required by code, describes common types of medical gas and vacuum systems, and introduces the safety requirements for installing, testing, and servicing these systems.

L1 REINFORCING IRONWORK

LEVEL 1

Curriculum Notes

- 117.5 Hours
- Published: 2005
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.
- A Spanish translation is available. Please see NCCER's online catalog for more information.

PAPERBACK	ISBN
Trainee Guide: $67	978-0-13-228220-8
Instructor's Guide: $67	978-0-13-228221-5

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.

Concrete Reinforcement *(40 Hours)*

Trainee $20 ISBN 978-0-13-228987-0
Instructor $20 ISBN 978-0-13-228993-1
(Module ID 39101-05) Describes the selection and use of rebar, bar supports, and welded-wire fabric. Presents general procedures for cutting, bending, splicing, and tying rebar, and placement of steel in various types of footings, columns, walls, and slabs.

Concrete Reinforcement Safety *(15 Hours)*

Trainee $20 ISBN 978-0-13-228988-7
Instructor $20 ISBN 978-0-13-228994-8
(Module ID 39102-05) Focuses on safety topics of particular concern to the reinforcing ironworker, including rebar-related hazards, fall protection, use of positioning devices, PPE, excavations, and lifting/carrying techniques.

Rigging Equipment *(10 Hours)*

Trainee $20 ISBN 978-0-13-228989-4
Instructor $20 ISBN 978-0-13-228995-5
(Module ID 39103-05) Describes the use and inspection of basic equipment and hardware used in rigging, including slings, wire rope, chains, and attaching hardware such as shackles, eyebolts, and hooks, as well as rigging knots.

Rigging Practices *(15 Hours)*

Trainee $20 ISBN 978-0-13-228991-7
Instructor $20 ISBN 978-0-13-228996-2
(Module ID 39104-05) Describes basic rigging and crane hazards and related safety procedures. Provides an overview of personnel lifting and lift planning, and introduces crane load charts and load balancing. Includes instructions for rigging and lifting pipe.

Commercial Blueprints *(20 Hours)*

Trainee $20 ISBN 978-0-13-228992-4
Instructor $20 ISBN 978-0-13-228997-9
(Module ID 39105-05) Explains the format and content of drawings typically found in a commercial drawings package.

Oxyfuel Cutting *(17.5 Hours)*

Trainee $20 ISBN 978-0-13-229379-2
Instructor $20 ISBN 978-0-13-229380-8
(Module ID 39106-05) Explains the safety requirements for oxyfuel cutting. Identifies equipment and setup requirements and explains how to light, adjust, and shut down oxyfuel equipment. Explains how to perform cutting techniques that include straight line, piercing, bevels, washing, and gouging.

L2 REINFORCING IRONWORK

LEVEL 2

Curriculum Notes

- 100 Hours
- Published: 2005
- Instructor's Guide includes access code to download TestGen software, module exams, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-227294-0
Instructor's Guide: $97	978-0-13-227295-7

MODULES

Reinforcing Ironwork Level Two comprises modules from NCCER's *Carpentry* and *Ironworking* curricula. 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.

Foundations and Flatwork *(15 Hours)*

Trainee $20 ISBN 978-0-13-015017-2
Instructor $20 ISBN 978-0-13-015027-1
(Module ID 27204-01) Covers the construction of forms for continuous, stepped continuous, pier and grade beam concrete footings. Describes the edge forms used for on-grade concrete slabs and similar structures. Forming terms, parts of forms and procedures for constructing basic footing and edge forms are included.

Concrete Forms *(32.5 Hours)*

Trainee $20 ISBN 978-0-13-015018-9
Instructor $20 ISBN 978-0-13-015028-8
(Module ID 27205-01) Covers the applications and construction methods for various types of job-built forms, including wall, column, slab-and-beam, and stair forms. Instructor's Guide includes instruction sheets for construction of various forms.

Handling and Placing Concrete *(22.5 Hours)*

Trainee $20 ISBN 978-0-13-015010-3
Instructor $20 ISBN 978-0-13-015020-2
(Module ID 27207-01) Covers the tools, equipment and procedures required for handling, placing, and finishing concrete at the job site. Describes joints made in concrete structures, the use of joint sealants, and form removal procedures. Safety procedures for handling, placing, and finishing concrete are emphasized.

Manufactured Forms *(22.5 Hours)*

Trainee $20 ISBN 978-0-13-015021-9
Instructor $20 ISBN 978-0-13-015031-8
(Module ID 27208-01) Covers the types of manufactured forms and form hardware systems used in the construction of walls, columns, deck and roof slabs, beams and girders, culverts, and highways. Includes information on flying forms, slipforms, shoring, and architectural finishes.

Metal Decking *(10 Hours)*

Trainee $20 ISBN 978-0-13-015428-6
Instructor $20 ISBN 978-0-13-015446-0
(Module ID 30116) Identifies decking types and profiles and how decking is packaged, shipped, and stored. Describes erecting decking and placing concrete safely. Explains the effects of deck penetrations and damage.

Introductory Skills for the Crew Leader *(16 Hours)*

Trainee $40 ISBN 978-0-13-103593-5
Instructor $40 ISBN 978-0-13-103594-2
(Module ID MT101) Teaches leadership skills required to supervise personnel. Discusses principles of project planning, scheduling, estimating, and management. Presents several case studies for student participation.

Scaffolding

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. 11 for ordering information.)
- Revised: 2015, Second Edition
- New printed Instructor's Package includes lesson plans and instructor's copy of Trainee Guide with an access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.
- A Spanish translation is available. Please see NCCER's online catalog for more information.

PAPERBACK	ISBN
Trainee Guide: $67	978-0-13-383081-1
Instructor's Package: $67	978-0-13-416731-2

MODULES

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

Introduction to the Trade *(7.5 Hours)*
Trainee $20 ISBN 978-0-13-378895-2
Instructor $20 ISBN 978-0-13-378903-4
(Module ID 31101-15) Introduces the scaffolding program, describes the duties of a scaffolder, and identifies scaffold types and scaffolding terms.

Trade Safety *(7.5 Hours)*
Trainee $20 ISBN 978-0-13-378896-9
Instructor $20 ISBN 978-0-13-378904-1
(Module ID 31102-15) Provides a comprehensive overview of the safety regulations and guidelines in the scaffolding industry.

Trade Tools and Equipment *(7.5 Hours)*
Trainee $20 ISBN 978-0-13-378897-6
Instructor $20 ISBN 978-0-13-378905-8
(Module ID 31103-15) Covers the safe use and applications of hand and power tools used in the trade.

Trade Math *(7.5 Hours)*
Trainee $20 ISBN 978-0-13-378898-3
Instructor $20 ISBN 978-0-13-378906-5
(Module ID 31104-15) Explains and gives examples of math calculations of scaffold loads, including area loads, concentrated loads, live loads, cantilevered loads, and wind loads.

Supported Scaffolds *(32.5 Hours)*
Trainee $20 ISBN 978-0-13-378899-0
Instructor $20 ISBN 978-0-13-378907-2
(Module ID 31105-15) Identifies the equipment used with supported scaffolds. Describes the procedures for erecting supported scaffolds.

Mobile Scaffolds *(10 Hours)*
Trainee $20 ISBN 978-0-13-378900-3
Instructor $20 ISBN 978-0-13-378908-9
(Module ID 31106-15) Identifies the different types of powered and manually propelled mobile scaffolds and describes their erection and operation.

Suspension Scaffolds *(7.5 Hours)*
Trainee $20 ISBN 978-0-13-378901-0
Instructor $20 ISBN 978-0-13-378945-4
(Module ID 31107-15) Identifies the types of equipment used with suspension scaffolds. Describes the rigging of suspension scaffolds.

Sheet Metal

L1 SHEET METAL

LEVEL 1

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. 11 for ordering information.)
- Revised: 2008, Third Edition
- NATE-Recognized Training Provider
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $67	978-0-13-604482-6
Instructor's Guide: $67	978-0-13-604483-3

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.

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.

Introduction to the Sheet Metal Trade *(5 Hours)*
Trainee $20 ISBN 978-0-13-604832-9
Instructor $20 ISBN 978-0-13-604878-7
(Module ID 04101-08) Summarizes the history and development of the sheet metal trade. Explains the benefits of apprenticeship training, and identifies career opportunities in the trade.

Tools of the Trade *(5 Hours)*
Trainee $20 ISBN 978-0-13-604833-6
Instructor $20 ISBN 978-0-13-604879-4
(Module ID 04102-08) Describes the hand and power tools used in the sheet metal trade, including layout tools and cutting, bending, and forming machines. Includes safety and maintenance guidelines.

Introduction to Sheet Metal Layout and Processes *(7.5 Hours)*
Trainee $20 ISBN 978-0-13-604834-3
Instructor $20 ISBN 978-0-13-604880-0
(Module ID 04103-08) Introduces parallel line development, radial line development, and triangulation. Covers the selection and use of layout, hand, and machine tools. Discusses how to transfer patterns, and how to cut, form, and assemble parts.

Trade Math One *(20 Hours)*
Trainee $20 ISBN 978-0-13-604835-0
Instructor $20 ISBN 978-0-13-604881-7
(Module ID 04104-08) Builds on trainees' basic math skills to solve trade-related problems. Covers calculations using denominate numbers, area and volume calculations, English-metric system conversions, basic geometry, and calculation of stretchouts.

Fabrication One – Parallel Line Development
(22.5 Hours)

Trainee $20 ISBN 978-0-13-604837-4
Instructor $20 ISBN 978-0-13-604882-4

(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 ISBN 978-0-13-604838-1
Instructor $20 ISBN 978-0-13-604883-1

(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 ISBN 978-0-13-604874-9
Instructor $20 ISBN 978-0-13-604884-8

(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 ISBN 978-0-13-604875-6
Instructor $20 ISBN 978-0-13-604886-2

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

Architectural Sheet Metal *(15 Hours)*

Trainee $20 ISBN 978-0-13-604877-0
Instructor $20 ISBN 978-0-13-604887-9

(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

LEVEL 2

Curriculum Notes

- 165 Hours
- Revised: 2008, Third Edition
- NATE-Recognized Training Provider
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-604484-0
Instructor's Guide: $97	978-0-13-604485-7

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 Two *(20 Hours)*

Trainee $20 ISBN 978-0-13-609931-4
Instructor $20 ISBN 978-0-13-609906-2

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

Plans and Specifications *(20 Hours)*

Trainee $20 ISBN 978-0-13-609932-1
Instructor $20 ISBN 978-0-13-609907-9

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

Fabrication Two – Radial Line Development
(55 Hours)

Trainee $20 ISBN 978-0-13-609933-8
Instructor $20 ISBN 978-0-13-609908-6

(Module ID 04203-08) Introduces radial line development principles used to determine layouts for sheet metal fittings. Includes practice layout and fabrication tasks that allow trainees to develop and demonstrate their skills.

Sheet Metal Duct Fabrication Standards
(7.5 Hours)

Trainee $20 ISBN 978-0-13-609935-2
Instructor $20 ISBN 978-0-13-609909-3

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

Air Properties and Distribution *(15 Hours)*

Trainee $20 ISBN 978-0-13-609936-9
Instructor $20 ISBN 978-0-13-609910-9

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

Bend Allowances *(5 Hours)*

Trainee $20 ISBN 978-0-13-609937-6
Instructor $20 ISBN 978-0-13-609911-6

(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 ISBN 978-0-13-609938-3
Instructor $20 ISBN 978-0-13-609912-3

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

Basic Piping Practices *(7.5 Hours)*

Trainee $20 ISBN 978-0-13-609939-0
Instructor $20 ISBN 978-0-13-609913-0

(Module ID 04208-08) Reviews the methods for measuring, cutting, and joining selected types of pipe using fittings, hangers, and supports. Also reviews pipe materials and applications.

Fiberglass Duct *(20 Hours)*

Trainee $20 ISBN 978-0-13-609905-5
Instructor $20 ISBN 978-0-13-609949-9

(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

LEVEL 3

Curriculum Notes

- 157.5 Hours
- Revised: 2009, Third Edition
- NATE-Recognized Training Provider
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-609962-8
Instructor's Guide: $97	978-0-13-609963-5

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.

Trade Math Three – Field Measuring and Fitting *(15 Hours)*

Trainee $20 ISBN 978-0-13-610511-4
Instructor $20 ISBN 978-0-13-610518-3

(Module ID 04301-09) Describes the techniques used for field measuring and layout of ductruns and fittings. Also provides practice in solving field measuring problems.

Air Systems *(10 Hours)*

Trainee $20 ISBN 978-0-13-610512-1
Instructor $20 ISBN 978-0-13-610520-6

(Module ID 04302-09) Reviews the operating principles, components, and applications of common air systems. Discusses constant volume systems, variable volume systems, variable temperature (VVT) systems, variable air volume (VAV) systems, and dual VAV systems.

Principles of Airflow *(22.5 Hours)*

Trainee $20 ISBN 978-0-13-610513-8
Instructor $20 ISBN 978-0-13-610521-3

(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 ISBN 978-0-13-610514-5
Instructor $20 ISBN 978-0-13-610522-0

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

Comprehensive Plan and Specification Reading *(30 Hours)*

Trainee $20 ISBN 978-0-13-610515-2
Instructor $20 ISBN 978-0-13-610523-7

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

Fabrication Three – Triangulation *(47.5 Hours)*

Trainee $20 ISBN 978-0-13-610516-9
Instructor $20 ISBN 978-0-13-610524-4

(Module ID 04306-09) Describes the principles of triangulation and how it can be used to measure ductrun fittings. Provides a variety of tasks to practice developing, laying out, and fabricating selected ductrun fittings.

Advanced Architectural Sheet Metal *(12.5 Hours)*

Trainee $20 ISBN 978-0-13-610517-6
Instructor $20 ISBN 978-0-13-610525-1

(Module ID 04307-09) Provides trainees with the opportunity to practice layout, fabrication, and installation of various architectural pieces.

L4 SHEET METAL

LEVEL 4

Curriculum Notes

- 150 Hours
- Revised: 2009, Third Edition
- NATE-Recognized Training Provider
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-609964-2
Instructor's Guide: $97	978-0-13-609965-9

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.

Shop Production and Organization *(15 Hours)*

Trainee $20 ISBN 978-0-13-214227-4
Instructor $20 ISBN 978-0-13-214233-5

(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 ISBN 978-0-13-214228-1
Instructor $20 ISBN 978-0-13-214234-2

(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 ISBN 978-0-13-214229-8
Instructor $20 ISBN 978-0-13-214235-9

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

Fume and Exhaust System Design *(25 Hours)*

Trainee $20 ISBN 978-0-13-214230-4
Instructor $20 ISBN 978-0-13-214236-6

(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 ISBN 978-0-13-214231-1
Instructor $20 ISBN 978-0-13-214237-3

(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 ISBN 978-0-13-214232-8
Instructor $20 ISBN 978-0-13-214238-0

(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.

Site Layout

L1 SITE LAYOUT

LEVEL 1

Curriculum Notes

- 162.5 Hours (Includes 72.5 hours of *Core Curriculum*, which is a prerequisite for Level 1 completion and must be purchased separately. See p. 11 for ordering information.)
- Published: 2004
- Instructor's Guide includes access code to download TestGen software, module exams, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $67	978-0-13-109173-3
Instructor's Guide: $67	978-0-13-109175-7

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 Site Layout *(10 Hours)*

Trainee $20 ISBN 978-0-13-109882-4
Instructor $20 ISBN 978-0-13-109887-9

(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 ISBN 978-0-13-109883-1
Instructor $20 ISBN 978-0-13-109888-6

(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.

Survey Equipment Use and Care One *(30 Hours)*

Trainee $20 ISBN 978-0-13-109884-8
Instructor $20 ISBN 978-0-13-109889-3

(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 ISBN 978-0-13-109886-2
Instructor $20 ISBN 978-0-13-109890-9

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

L2 SITE LAYOUT

LEVEL 2

Curriculum Notes

- 145 Hours
- Published: 2004
- Instructor's Guide includes access code to download TestGen software, module exams, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-109176-4
Instructor's Guide: $97	978-0-13-109177-1

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.

Advanced Surveying Math *(30 Hours)*

Trainee $20 ISBN 978-0-13-160021-8
Instructor $20 ISBN 978-0-13-160029-4

(Module ID 78201-04) Covers the advanced math needed for site layout, including area and volume of solids, use of the Pythagorean Theorem to solve for distances and angles, and use of polar and rectangular coordinates. Covers common coordinate and grid systems.

Survey Equipment Use and Care Two, EDMIs and Total Stations *(10 Hours)*

Trainee $20 ISBN 978-0-13-160022-5
Instructor $20 ISBN 978-0-13-160030-0

(Module ID 78202-04) Covers the setup, use, calibration, and care of electronic distance measuring instruments and total stations.

Control Setup *(30 Hours)*

Trainee $20 ISBN 978-0-13-160023-2
Instructor $20 ISBN 978-0-13-160031-7

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

Boundary and Topography Surveys *(10 Hours)*

Trainee $20 ISBN 978-0-13-160024-9
Instructor $20 ISBN 978-0-13-160032-4

(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)*

Trainee $20 ISBN 978-0-13-160025-6
Instructor $20 ISBN 978-0-13-160033-1

(Module ID 78205-04) Covers the use of integrated total station systems and GPS surveying systems. Explains the use of integrated field and office software to collect and manage data.

Concrete Properties and Quality Control *(15 Hours)*

Trainee $20 ISBN 978-0-13-160026-3
Instructor $20 ISBN 978-0-13-160034-8

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

Means and Methods *(40 Hours)*

Trainee $20 ISBN 978-0-13-160027-0
Instructor $20 ISBN 978-0-13-160035-5

(Module ID 78207-04) Provides extensive coverage of soils and their classifications and explains how various soils behave in excavations. Covers the safety procedures and equipment used when working in or near trenches. Provides layout procedures for footings, piers, building corners, columns, walls, embedments, and stairs.

Sprinkler Fitting

L1 SPRINKLER FITTING

LEVEL 1

Curriculum Notes

- 145 Hours (Includes 72.5 hours of Core Curriculum which is a prerequisite for Level 1 completion and must be purchased separately. See p. 11 for ordering information.)
- Revised: 2013, Third Edition to reflect *NFPA 13*
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $67	978-0-13-380297-9
Instructor's Guide: $67	978-0-13-380319-8

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.

Orientation to the Trade *(5 Hours)*

Trainee $20 ISBN 978-0-13-378229-5
Instructor $20 ISBN 978-0-13-378249-3

(Module ID 18101-13) Identifies sprinkler fitter career opportunities and typical work environments. Examines trade-specific safety hazards and identifies shop plans specific to the sprinkler fitting industry. Introduces workplace safety, material handling, and the proper use of common tools.

Introduction to Components and Systems *(7.5 Hours)*

Trainee $20 ISBN 978-0-13-378240-0
Instructor $20 ISBN 978-0-13-378250-9

(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)*

Trainee $20 ISBN 978-0-13-378246-2
Instructor $20 ISBN 978-0-13-378251-6

(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)*

Trainee $20 ISBN 978-0-13-378247-9
Instructor $20 ISBN 978-0-13-378252-3

(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)*

Trainee $20 ISBN 978-0-13-378435-0
Instructor $20 ISBN 978-0-13-378562-3

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

Underground Pipe *(17.5 Hours)*

Trainee $20 ISBN 978-0-13-378248-6
Instructor $20 ISBN 978-0-13-378254-7

(Module ID 18106-13) Details underground piping installations for various types of pipe. Explains thrust blocks and restraints. In-building risers, hydrants, yard valves, and hydrant houses are discussed as are testing, inspection, flushing, and chlorinating. The underground test certificate is also covered.

L2 SPRINKLER FITTING

LEVEL 2

Curriculum Notes

- 152.5 Hours
- Revised: 2013, Third Edition to reflect *NFPA 13*
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $90	978-0-13-380290-0
Instructor's Guide: $90	978-0-13-380301-3

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.

Hangers, Supports, Restraints, and Guides *(15 Hours)*

Trainee $20 **ISBN 978-0-13-378255-4**
Instructor $20 **ISBN 978-0-13-378263-9**
(Module ID 18201-13) Identifies strength/spacing 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 **ISBN 978-0-13-378256-1**
Instructor $20 **ISBN 978-0-13-378264-6**
(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 **ISBN 978-0-13-378259-2**
Instructor $20 **ISBN 978-0-13-378265-3**
(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 **ISBN 978-0-13-378257-8**
Instructor $20 **ISBN 978-0-13-378267-7**
(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 **ISBN 978-0-13-378260-8**
Instructor $20 **ISBN 978-0-13-378268-4**
(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 **ISBN 978-0-13-378261-5**
Instructor $20 **ISBN 978-0-13-378269-1**
(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 **ISBN 978-0-13-378262-2**
Instructor $20 **ISBN 978-0-13-378270-7**
(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.

L3 SPRINKLER FITTING

LEVEL 3

Curriculum Notes

- 147.5 Hours
- Revised: 2013, Third Edition to reflect *NFPA 13*
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $90	**978-0-13-383079-8**
Instructor's Guide: $90	**978-0-13-383923-4**

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.

Deluge/Preaction Systems *(40 Hours)*

Trainee $20 **ISBN 978-0-13-378871-6**
Instructor $20 **ISBN 978-0-13-378876-1**
(Module ID 18301-13) Describes deluge and preaction systems and explains installation techniques and troubleshooting. Covers hydraulic and pneumatic release mechanisms, non-interlocked and interlocked preaction systems and Firecycle® Systems.

Standpipes *(25 Hours)*

Trainee $20 **ISBN 978-0-13-378872-3**
Instructor $20 **ISBN 978-0-13-378877-8**
(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**
Instructor $20 **ISBN 978-0-13-378879-2**
(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 **ISBN 978-0-13-378874-7**
Instructor $20 **ISBN 978-0-13-378880-8**
(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 **ISBN 978-0-13-378875-4**
Instructor $20 **ISBN 978-0-13-378881-5**
(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*
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $90	**978-0-13-383105-4**
Instructor's Guide: $90	**978-0-13-383595-3**

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.

System Layout *(45 Hours)*

Trainee $20 **ISBN 978-0-13-378882-2**
Instructor $20 **ISBN 978-0-13-378888-4**
(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 **ISBN 978-0-13-378883-9**
Instructor $20 **ISBN 978-0-13-378889-1**
(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 **ISBN 978-0-13-378884-6**
Instructor $20 **ISBN 978-0-13-378890-7**
(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 **ISBN 978-0-13-378885-3**
Instructor $20 **ISBN 978-0-13-378892-1**
(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 **ISBN 978-0-13-378887-7**
Instructor $20 **ISBN 978-0-13-378893-8**
(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 performanc accreditation tasks required to complete the current SENSE program.

L1 WELDING

LEVEL 1

Curriculum Notes

- 357.5 Hours (Includes 72.5 Hours of *Core Curriculum*, which is a prerequisite for Level 1 completion and must be purchased separately. See p. 11 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.*
- New printed Instructor's Package includes lesson plans and instructor's copy of Trainee Guide with an access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

HARDCOVER	ISBN
Trainee Guide: $69	978-0-13-413110-8
PAPERBACK	**ISBN**
Trainee Guide: $67	978-0-13-416311-6
Instructor's Package: $67	978-0-13-428575-7
NCCERconnect Access Card: $67	978-0-13-452916-5
NCCERconnect + Hardcover Trainee Guide: $94	978-0-13-457828-6
NCCERconnect + Paperback Trainee Guide: $92	978-0-13-457833-0

MODULES

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

Welding Safety *(5 Hours)*
Trainee $20 ISBN 978-0-13-416580-6
Instructor $20 ISBN 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 ISBN 978-0-13-418268-1
Instructor $20 ISBN 978-0-13-414193-0
(Module ID 29102-15) Explains the safety requirements for oxyfuel cutting. Identifies oxyfuel cutting equipment and setup requirements. Explains how to light, adjust, and shut down oxyfuel equipment. Trainees will perform cutting techniques that include straight line, piercing, bevels, washing, and gouging.

Plasma Arc Cutting *(7.5 Hours)*
Trainee $20 ISBN 978-0-13-418269-8
Instructor $20 ISBN 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 ISBN 978-0-13-418270-4
Instructor $20 ISBN 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 washing and gouging activities.

Base Metal Preparation *(12.5 Hours)*
Trainee $20 ISBN 978-0-13-414043-8
Instructor $20 ISBN 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 ISBN 978-0-13-414044-5
Instructor $20 ISBN 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 – Equipment and Setup *(5 Hours)*
Trainee $20 ISBN 978-0-13-418027-4
Instructor $20 ISBN 978-0-13-414197-8
(Module ID 29107-15) Describes SMAW welding and welding safety. Explains how to connect welding current and set up arc welding equipment. Also explains how to use tools for cleaning welds.

SMAW Electrodes *(2.5 Hours)*
Trainee $20 ISBN 978-0-13-418026-7
Instructor $20 ISBN 978-0-13-414198-5
(Module ID 29108-15) Describes electrode characteristics and different types of filler metals. Reviews the role of the American Welding Society (AWS) and the American Society of Mechanical Engineers (ASME). Explains proper storage and control of filler metals and identifies the use of codes.

SMAW – Beads and Fillet Welds *(100 Hours)*
Trainee $20 ISBN 978-0-13-418025-0
Instructor $20 ISBN 978-0-13-414199-2
(Module ID 29109-15) Describes the preparation and setup of arc welding equipment and the process of striking an arc. Explains how to detect and correct arc blow. Describes how to make stringer, weave, overlapping beads, and fillet welds.

Joint Fit-Up and Alignment *(5 Hours)*
Trainee $20 ISBN 978-0-13-418024-3
Instructor $20 ISBN 978-0-13-414200-5
(Module ID 29110-15) Describes job code specifications. Explains how to use fit-up gauges and measuring devices to check fit-up and alignment and use plate and pipe fit-up and alignment tools to properly prepare joists. Explains how to check for joint misalignment and poor fit.

SMAW – Groove Welds with Backing *(50 Hours)*
Trainee $20 ISBN 978-0-13-418023-6
Instructor $20 ISBN 978-0-13-414201-2
(Module ID 29111-15) Introduces groove welds and explains how to set up welding equipment for making groove welds. Describes how to make groove welds with backing. Provides procedures for making flat, horizontal, vertical, and overhead groove welds.

SMAW – Open-Root Groove Welds – Plate *(60 Hours)*
Trainee $20 ISBN 978-0-13-418022-9
Instructor $20 ISBN 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

LEVEL 2

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.*
- New printed Instructor's Package includes lesson plans and instructor's copy of Trainee Guide with an access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

HARDCOVER	ISBN
Trainee Guide: $99	978-0-13-431110-4
PAPERBACK	**ISBN**
Trainee Guide: $97	978-0-13-416310-9
Instructor's Package: $97	978-0-13-438525-9
NCCERconnect Access Card: $97	978-0-13-452907-3
NCCERconnect + Hardcover Trainee Guide: $124	978-0-13-460120-5
NCCERconnect + Paperback Trainee Guide: $122	978-0-13-457831-6

MODULES

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

Welding Symbols *(5 Hours)*
Trainee $20 ISBN 978-0-13-417950-6
Instructor $20 ISBN 978-0-13-415273-8
(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).

Reading Welding Detail Drawings *(10 Hours)*

Trainee $20 **ISBN 978-0-13-417953-7**
Instructor $20 **ISBN 978-0-13-415275-2**

(Module ID 29202-15) Identifies and explains welding detail drawings. Describes lines, fills, object views, and dimensioning on drawings. Explains how to use notes on drawings and the bill of materials. Explains how to sketch and draw basic welding drawings.

Physical Characteristics and Mechanical Properties of Metals *(7.5 Hours)*

Trainee $20 **ISBN 978-0-13-417954-4**
Instructor $20 **ISBN 978-0-13-415276-9**

(Module ID 29203-15) Explains physical characteristics, mechanical properties, composition, and classification of common ferrous and nonferrous metals. Identifies the various standard metal forms and structural shapes. Shows how to extract metal information from Welding Procedure Specification (WPS) sheets and Procedure Qualification Records (PQRs). Covers visual inspection, magnetic testing, and X-ray fluorescent spectrometry methods used to identify metals.

Preheating and Postheating of Metals *(5 Hours)*

Trainee $20 **ISBN 978-0-13-418019-9**
Instructor $20 **ISBN 978-0-13-415278-3**

(Module ID 29204-15) Explains preheating, interpass temperature control, and postheating procedures that sometimes need to be done to preserve weldment strength, ductility, and weld quality. Covers the equipment used for heat treating metals.

GMAW and FCAW – Equipment and Filler Metals *(10 Hours)*

Trainee $20 **ISBN 978-0-13-418018-2**
Instructor $20 **ISBN 978-0-13-414185-5**

(Module ID 29205-15) Describes general safety procedures for GMAW and FCAW. Identifies GMAW and FCAW equipment and explains the filler metals and shielding gases used to perform GMAW and FCAW. Explains how to set up and use GMAW and FCAW equipment and how to clean GMAW and FCAW welds.

GMAW – Plate *(60 Hours)*

Trainee $20 **ISBN 978-0-13-417970-4**
Instructor $20 **ISBN 978-0-13-414187-9**

(Module ID 29209-15) Explains how to set up and use GMAW equipment and how to select and use different filler metals and shielding gases. Describes how to make multiple-pass fillet and V-groove welds on carbon steel plate in various positions.

FCAW – Plate *(60 Hours)*

Trainee $20 **ISBN 978-0-13-420171-9**
Instructor $20 **ISBN 978-0-13-420170-2**

(Module ID 29210-15) Explains how to set up and use FCAW equipment and how to select and use different filler metals and shielding gases. Describes how to make multiple-pass fillet and V-groove welds on carbon steel plate in various positions.

GTAW – Equipment and Filler Metals *(10 Hours)*

Trainee $20 **ISBN 978-0-13-417969-8**
Instructor $20 **ISBN 978-0-13-414188-6**

(Module ID 29207-15) Explains GTAW safety. Identifies and explains the use of GTAW equipment, filler metals, and shielding gases. Covers the setup of GTAW equipment.

GTAW – Plate *(60 Hours)*

Trainee $20 **ISBN 978-0-13-417968-1**
Instructor $20 **ISBN 978-0-13-414192-3**

(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.

L3 WELDING

LEVEL 3

Curriculum Notes

- 470 Hours (370 Required; 100 Elective/Optional)
- Revised: 2016, Fifth Edition
- New printed Instructor's Package includes lesson plans and instructor's copy of Trainee Guide with an access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-448245-3
Instructor's Package: $97	978-0-13-454305-5
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 and the Instructor's Package. The following ISBN and pricing information is for ordering individual modules only.

SMAW – Open-Root Pipe Welds *(100 Hours)*

Trainee $20 **ISBN 978-0-13-448560-7**
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)*

Trainee $20 **ISBN 978-0-13-448564-5**
Instructor $20 **ISBN 978-0-13-448562-1**

(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)*

Trainee $20 **ISBN 978-0-13-448566-9**
Instructor $20 **ISBN 978-0-13-448565-2**

(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.

GTAW – Carbon Steel Pipe *(80 Hours)*

Trainee $20 **ISBN 978-0-13-448568-3**
Instructor $20 **ISBN 978-0-13-448567-6**

(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 – Low Alloy and Stainless Steel Pipe *(70 Hours)*

Trainee $20 **ISBN 978-0-13-448570-6**
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 Elective Hours)*

Trainee $20 **ISBN 978-0-13-448573-7**
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.

L4 WELDING

Curriculum Notes

- 172.5 Hours
- Revised: 2016, Fifth Edition
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-451422-2
Instructor's Guide: $97	978-0-13-457591-9
NCCERconnect Access Card: $97	978-0-13-452915-8
NCCERconnect + Trainee Guide: $122	978-0-13-469255-5

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.

GMAW – Aluminum Plate *(30 Hours)*

Trainee $20 **ISBN 978-0-13-467767-5**
Instructor $20 **ISBN 978-0-13-467766-8**

(Module ID 29401-16) Covers the setup of GMAW equipment for welding aluminum plate. Explains aluminum metallurgy and the characteristics of aluminum welding; how to clean and prepare aluminum plate coupons for welding; and problems often encountered in aluminum welds. Explains GMAW techniques used in aluminum welding. Provides GMAW procedures on how to build weld pads on aluminum plate; how to make fillet welds on aluminum plate in the 1F, 2F, 3F, and 4F positions; and how to make V-groove welds on aluminum plate with backing in the 1G, 2G, 3G, and 4G positions.

GTAW – Aluminum Plate *(30 Hours)*

Trainee $20 **ISBN 978-0-13-467765-1**
Instructor $20 **ISBN 978-0-13-467764-4**

(Module ID 29402-16) Covers the setup of GTAW equipment for welding aluminum plate. Explains how to clean and prepare aluminum plate coupons for welding, and how to select the aluminum filler metals and shielding gases used in the GTAW process. Explains GTAW techniques used in aluminum welding. Provides GTAW procedures on how to build weld pads on aluminum plate; how to make fillet welds on aluminum plate in the 1F, 2F, 3F, and 4F positions; and how to make V-groove welds on aluminum plate with backing in the 1G, 2G, 3G, and 4G positions.

GTAW – Aluminum Pipe *(50 Hours)*

Trainee $20 **ISBN 978-0-13-467763-7**
Instructor $20 **ISBN 978-0-13-467761-3**

(Module ID 29403-16) Covers the setup of GTAW equipment for welding aluminum pipe. Explains how to clean and prepare aluminum pipe coupons for welding. Addresses GTAW techniques used to make V-groove and modified U-groove welds on aluminum pipe with and without backing. Provides GTAW procedures on how to make V-groove or modified U-groove welds on aluminum pipe in the 2G, 5G, and 6G positions.

GMAW – Aluminum Pipe *(50 Hours)*

Trainee $20 **ISBN 978-0-13-467760-6**
Instructor $20 **ISBN 978-0-13-467759-0**

(Module ID 29404-16) Covers the setup of GMAW equipment for welding aluminum pipe. Addresses GMAW techniques used to make V-groove welds on aluminum pipe with and without backing. Explains how to clean and prepare aluminum pipe coupons for welding. Provides GMAW procedures on how to make V-groove welds on aluminum pipe in the 2G, 5G, and 6G positions.

Soldering and Brazing *(12.5 Hours)*

Trainee $20 **ISBN 978-0-13-467757-6**
Instructor $20 **ISBN 978-0-13-467758-3**

(Module ID 29405-16) Introduces the equipment, techniques, and materials used to safely join copper tubing through both brazing and soldering processes. Covers the required PPE, preparation, and work processes in detail. Also presents procedures for brazing copper to dissimilar materials such as steel.

Mobile Crane Operations

L1 MOBILE CRANE OPERATIONS

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. 11 for ordering information.)
- Revised: 2004, Second Edition
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $67	978-0-13-109864-0
Instructor's Guide: $67	978-0-13-109865-7

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 ISBN 978-0-13-160065-2
Instructor $20 ISBN 978-0-13-160071-3
(Module ID 21101-04) Provides an overview of the entire course and highlights the duties and responsibilities of a mobile crane operator. Discusses *ASME B30.5* and *OSHA 550,* as well as career opportunities and operator requirements.

Basic Principles of Cranes *(15 Hours)*

Trainee $20 ISBN 978-0-13-160066-9
Instructor $20 ISBN 978-0-13-160072-0
(Module ID 21102-04) Introduces mobile crane equipment with an in-depth discussion of terminology and nomenclature. Explains the basic scientific principles associated with mobile crane operation.

Rigging Practices *(15 Hours)*

Trainee $20 ISBN 978-0-13-160067-6
Instructor $20 ISBN 978-0-13-160073-7
(Module ID 21103-04) Presents the fundamentals of rigging. Discusses a variety of rigging gear, components, and configurations and their applications within the mobile crane industry.

Crane Safety *(15 Hours)*

Trainee $20 ISBN 978-0-13-160068-3
Instructor $20 ISBN 978-0-13-160074-4
(Module ID 21104-04) Introduces various safety aspects of mobile crane operation, including equipment inspection, site hazard identification, and required personal protective equipment. Explains how to work with site plans and specifications.

Operating a Crane *(25 Hours)*

Trainee $20 ISBN 978-0-13-160070-6
Instructor $20 ISBN 978-0-13-160075-1
(Module ID 21105-04) Describes the basic functions of a crane, as well as standard procedures for starting up and shutting down a crane. Provides an opportunity to become familiar with the actual operation of a crane and the functions of its controls.

L2 MOBILE CRANE OPERATIONS

LEVEL 2

Curriculum Notes

- 145 Hours
- Revised: 2004, Second Edition
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-109866-4
Instructor's Guide: $97	978-0-13-109867-1

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.

Communication *(10 Hours)*

Trainee $20 ISBN 978-0-13-160076-8
Instructor $19 ISBN 978-0-13-160087-4
(Module ID 21201-04) Examines the communication process, addressing obstacles such as abstractions, fear, and lack of experience as well as environmental factors. Covers methods of communication. Presents at the *ASME B30.5* hand signals, including the appropriate operator action when the signal is given and the expected machine movement.

Machine Power Flow *(27.5 Hours)*

Trainee $20 ISBN 978-0-13-160077-5
Instructor $20 ISBN 978-0-13-160088-1
(Module ID 21202-04) 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.

Preventive Maintenance *(22.5 Hours)*

Trainee $20 ISBN 978-0-13-160079-9
Instructor $20 ISBN 978-0-13-160089-8
(Module ID 21203-04) Covers crane preventive maintenance and compliance inspections. Presents safety procedures and equipment/material considerations for inspections.

Wire Rope *(25 Hours)*

Trainee $20 ISBN 978-0-13-160080-5
Instructor $20 ISBN 978-0-13-160090-4
(Module ID 21204-04) 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.

Computer Aids/Operator Aids *(20 Hours)*

Trainee $20 ISBN 978-0-13-160081-2
Instructor $20 ISBN 978-0-13-160091-1
(Module ID 21205-04) Provides information on load moment indicators, anti-two-block devices, load indicators, and other operator aids that are installed in cranes. Describes input devices associated with these operator aids and the information they provide.

Load Dynamics *(15 Hours)*

Trainee $20 ISBN 978-0-13-160082-9
Instructor $20 ISBN 978-0-13-160092-8
(Module ID 21206-04) Covers leverage and stability, operational quadrants, submerged lifts, non-centered lifts, and other factors that affect stability.

On-Site Equipment Movement *(25 Hours)*

Trainee $20 ISBN 978-0-13-160083-6
Instructor $20 ISBN 978-0-13-160093-5
(Module ID 21207-04) Covers site hazards and restrictions that could hinder on-site crane movement; safety considerations involved in crane movement over unlevel ground; pick-and-carry operations; and power line contact. Also addresses flotation capacity.

L3 MOBILE CRANE OPERATIONS

LEVEL 3

Curriculum Notes

- 155 Hours (145 Required; 10 Elective/Optional)
- Revised: 2005, Second Edition
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-109868-8
Instructor's Guide: $97	978-0-13-109870-1

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.

Load Charts *(25 Hours)*

Trainee $20 ISBN 978-0-13-168282-5
Instructor $20 ISBN 978-0-13-168291-7
(Module ID 21301-05) 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.

Telescopic Boom Attachment Assembly and Disassembly *(20 Hours)*

Trainee $20 ISBN 978-0-13-168283-2
Instructor $20 ISBN 978-0-13-168292-4

(Module ID 21302-05) Covers the stowing and erection of the swing-away extension, A-frame jib, and auxiliary single-sheave boom head, as well the assembly and removal of intermediate boom sections.

Advanced Operational Techniques *(20 Hours)*

Trainee $20 ISBN 978-0-13-168284-9
Instructor $20 ISBN 978-0-13-168293-1

(Module ID 21303-05) Covers multi-crane lifts, critical lifts, blind lifts, and demolition. Includes sections on how to use magnet and vacuum lifting devices and how to operate a mobile crane in cold weather.

Lift Planning *(20 Hours)*

Trainee $20 ISBN 978-0-13-168286-3
Instructor $20 ISBN 978-0-13-168296-2

(Module ID 21304-05) Discusses lift plan implementation, including reference information, calculations, single- and multiple-crane lifting, critical lifts, and engineering considerations.

Hoisting Personnel *(20 Hours)*

Trainee $20 ISBN 978-0-13-168288-7
Instructor $20 ISBN 978-0-13-168297-9

(Module ID 21305-05) Examines *ASME B30.23* and *29 CFR 1926.550(g)* requirements while presenting advanced operation techniques for hoisting personnel.

Lattice Boom Assembly and Disassembly *(25 Hours)*

Trainee $20 ISBN 978-0-13-168289-4
Instructor $20 ISBN 978-0-13-168298-6

(Module ID 21306-05) Provides a step-by-step look at short- and long-lattice boom assembly and disassembly.

Emergency Procedures *(15 Hours)*

Trainee $20 ISBN 978-0-13-168285-6
Instructor $20 ISBN 978-0-13-168294-8

(Module ID 21307-05) Includes information on accident prevention and investigation, the hazards of power line contact, and failures that may occur during lifting operations.

Transporting Requirements *(10 Elective Hours)*

Trainee $20 ISBN 978-0-13-168290-0
Instructor $20 ISBN 978-0-13-168299-3

(Module ID 21308-05) 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.

Rigger/Signal Person

BASIC RIGGER

Curriculum Notes

- 40 Hours
- Revised: 2011, Second Edition
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.
- A Spanish translation of Rigging Fundamentals is available. Please see NCCER's online catalog for more information.

PAPERBACK	ISBN
Trainee Guide: $49	978-0-13-215456-7
Instructor's Guide: $49	978-0-13-215457-4

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.

Basic Rigging *(15 Hours)*

(Module ID 00106-09; from *Core Curriculum*)

Trainee $20 ISBN 978-0-13-266196-6
Instructor $20 ISBN 978-0-13-266200-0

Rigging Equipment *(10 Hours)*

Trainee $20 ISBN 978-0-13-266176-8
Instructor $20 ISBN 978-0-13-266178-2

(Module ID 38101-11) Describes the use and inspection of basic equipment and hardware used in rigging, including slings, wire rope, and chains. Discusses attaching hardware such as shackles, eyebolts, and hooks, as well as rigging knots. Explains sling angles. Covers tuggers, jacks, hoists, and ratchet-lever hoists.

Rigging Practices *(15 Hours)*

Trainee $20 ISBN 978-0-13-266177-5
Instructor $20 ISBN 978-0-13-266179-9

(Module ID 38102-11) Describes basic rigging and crane hazards as well as safety practices related to general rigging activities, working around power lines, and emergency response. Covers procedures for using slings and rigging pipes and valves.

INTERMEDIATE RIGGER

Curriculum Notes

- 55 Hours
- Published: 2011
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $49	978-0-13-215458-1
Instructor's Guide: $49	978-0-13-215460-4

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.

Intermediate Rigging *(10 Hours)*

Trainee $20 ISBN 978-0-13-266181-2
Instructor $20 ISBN 978-0-13-266185-0

(Module ID 38201-11) Describes the basic procedures for using the various types of slings and for determining sling stress. Introduces lift plans, crane load charts, determining the center of gravity of a load, and using cranes to lift personnel. Describes sling selection and the use of jacks, hoists, and rollers to move loads.

Wire Rope *(10 Hours)*

Trainee $20 ISBN 978-0-13-266182-9
Instructor $20 ISBN 978-0-13-266186-7

(Module ID 38202-11) Covers the components of wire rope, as well as inspection requirements and procedures for using wire rope, load blocks, and sheaves. Explains the proper installation of wire rope, as well as maintenance guidelines and end terminations and preparation.

Boom Assembly and Disassembly *(20 Hours)*

Trainee $20 ISBN 978-0-13-266183-6
Instructor $20 ISBN 978-0-13-266187-4

(Module ID 38203-11) Provides step-by-step instructions for the assembly and disassembly of long and short lattice booms as well as the extension and stowing of swing-away lattice booms for telescopic booms. Covers the installation and stowing of A-frame jibs.

Basic Principles of Cranes *(15 Hours)*

Trainee $20 ISBN 978-0-13-266184-3
Instructor $20 ISBN 978-0-13-266188-1

(Module ID 38204-11) Introduces mobile crane equipment with an in-depth discussion of terminology and nomenclature. Explains the basic scientific principles associated with mobile crane operation.

ADVANCED RIGGER

Curriculum Notes

- 65 Hours
- Published: 2011
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $49	978-0-13-215461-1
Instructor's Guide: $49	978-0-13-215462-8

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.

Advanced Rigging *(20 Hours)*
Trainee $20 ISBN 978-0-13-266189-8
Instructor $20 ISBN 978-0-13-266192-8
(Module ID 38301-11) Explains how the load weight and center of gravity affect a lift. Covers sling selection and spreader bar use, as well as the use of cribbing and inclined planes. Includes case studies from three complex lifts.

Lift Planning *(40 Hours)*
Trainee $20 ISBN 978-0-13-266190-4
Instructor $20 ISBN 978-0-13-266193-5
(Module ID 38302-11) Provides an in-depth look at the development of a lift plan. Topics include reference information, load calculations, planning for multiple-crane lifts, engineering considerations, and application of load charts.

Personnel Lifts *(5 Hours)*
Trainee $20 ISBN 978-0-13-266191-1
Instructor $20 ISBN 978-0-13-266194-2
(Module ID 38303-11) Discusses *ASME B30.23* and *29CFR 1926.550 (g)* and various recommendations governing the safe hoisting of personnel. Covers platform and crane requirements, as well as inspection and test lifting.

SIGNAL PERSON

Curriculum Notes

- 40 Hours
- Published: 2011
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $49	978-0-13-215454-3
Instructor's Guide: $49	978-0-13-215455-0

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.

Communication *(10 Hours)*
Trainee $20 ISBN 978-0-13-266195-9
Instructor $20 ISBN 978-0-13-266199-7
(Module ID 53101-11) Describes the communication process between the rigger and the crane operator. Covers electronic communication as well as ASME hand signals for mobile, tower, and overhead cranes.

Basic Principles of Cranes *(15 Hours)*
(Module ID 38204-11; from *Intermediate Rigging*)
Trainee $20 ISBN 978-0-13-266184-3
Instructor $20 ISBN 978-0-13-266188-1

Crane Safety *(15 Hours)*
(Module ID 21104-04; from *Mobile Crane Operations Level One*)
Trainee $20 ISBN 978-0-13-266197-3
Instructor $20 ISBN 978-0-13-266201-7

Tower Crane Operator

L1 TOWER CRANE OPERATOR

LEVEL 1

Curriculum Notes

- 177.5 Hours (Includes 72.5 hours of *Core Curriculum*, which is a prerequisite for Level 1 completion and must be purchased separately. See p. 11 for ordering information.)
- Published: 2010
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $67	978-0-13-213720-1
Instructor's Guide: $67	978-0-13-213721-8

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.

Orientation to the Trade *(5 Hours)*
Trainee $20 ISBN 978-0-13-213820-8
Instructor $20 ISBN 978-0-13-213827-7
(Module ID 48101-10) Provides an overview of the tower crane industry and highlights the duties and responsibilities of a tower crane operator. Discusses ASME and OSHA standards, as well as career opportunities and operator requirements.

Basic Principles of Tower Cranes *(20 Hours)*
Trainee $20 ISBN 978-0-13-213821-5
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)*
Trainee $20 ISBN 978-0-13-213822-2
Instructor $20 ISBN 978-0-13-213830-7
(Module ID 48103-10) Introduces various safety aspects of tower crane operation, including equipment inspection, rigging, swing paths, and site hazard identification.

Rigging Practices *(15 Hours)*
Trainee $20 ISBN 978-0-13-213823-9
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.

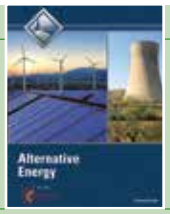
Load Charts *(15 Hours)*
Trainee $20 ISBN 978-0-13-213824-6
Instructor $20 ISBN 978-0-13-213832-1
(Module ID 48105-10) Explains how to use load charts to calculate safe lifting capacities for self-erecting, luffing boom, and hammerhead tower cranes. Also covers parts of line and counterweight configurations.

Communications *(10 Hours)*
Trainee $20 ISBN 978-0-13-213825-3
Instructor $20 ISBN 978-0-13-213798-0
(Module ID 48106-10) Covers the fundamentals of the communication process, including verbal and nonverbal methods of communication. Also presents the *ASME B30.3* hand signals, including the appropriate operator action when the signal is given.

Operating a Tower Crane *(25 Hours)*
Trainee $20 ISBN 978-0-13-213826-0
Instructor $20 ISBN 978-0-13-213799-7
(Module ID 48107-10) Describes the basic functions of a tower crane, as well as standard procedures for starting up and shutting down self-erecting, luffing boom, and hammerhead tower cranes. Provides an opportunity for trainees to become familiar with the actual operation of a tower crane and the functions of its controls.

Alternative Energy

ALTERNATIVE ENERGY



GBCI CMP

Curriculum Notes

- *Introduction to the Power Industry* is a prerequisite for completion and must be purchased separately. See p. 83 for ordering information.
- 132.5 Hours
- Published: 2011
- Endorsed by the Florida Energy Workforce Consortium in support of the 17th Career Cluster developed for Energy, *Alternative Energy* investigates the viability and value of fossil fuel alternatives, such as biomass/biofuel, nuclear, solar, and wind.
- The intended audience is secondary and post-secondary programs, as well any programs designed to articulate into a green career track.
- *Introduction to Alternative Energy* (Module ID 74101-11) has been approved for 25 general continuing education hours under GBCI's Credential Maintenance Program.
- This craft requires additional instructor qualifications. For more information, contact NCCER Customer Service at 1-888-622-3720.

- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $67	978-0-13-266625-1
Instructor's Guide: $67	978-0-13-266788-3

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.

Introduction to Alternative Energy *(25 Hours)*
Trainee $20 ISBN 978-0-13-272935-2
Instructor $20 ISBN 978-0-13-272940-6
(Module ID 74101-11) Identifies the need for alternative energy development. Describes the contributions and potential of individual alternative energy sources. Also covers the present U.S. electrical grid and issues affecting specific alternative energy source tie-in and reliability.

Biomass and Biofuels *(22.5 Hours)*
Trainee $20 ISBN 978-0-13-272936-9
Instructor $20 ISBN 978-0-13-272941-3
(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)*
Trainee $20 ISBN 978-0-13-272937-6
Instructor $20 ISBN 978-0-13-272942-0
(Module ID 74103-11) Describes nuclear power and its sources. Discusses the advantages and disadvantages of nuclear power, the future of nuclear energy, and nuclear power generation.

Solar Power *(25 Hours)*
Trainee $20 ISBN 978-0-13-272938-3
Instructor $20 ISBN 978-0-13-272943-7
(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)*
Trainee $20 ISBN 978-0-13-272939-0
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

L1 SOLAR PHOTOVOLTAIC SYSTEMS INSTALLER

LEVEL 1

GBCI CMP

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. 11 for ordering information.)
- Published: 2011
- Developed using NABCEP's PV Task Analysis and aligned with NABCEP's PV Installer Certification.
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.
- *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.

PAPERBACK	ISBN
Trainee Guide: $67	978-0-13-257110-4
Instructor's Guide: $67	978-0-13-257117-3

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.

Introduction to Solar Photovoltaics *(40 Hours)*

Trainee $22 ISBN 978-0-13-213726-3
Instructor $22 ISBN 978-0-13-213727-0
(Module ID 57101-10) 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 ISBN 978-0-13-266202-4
Instructor $20 ISBN 978-0-13-266207-9
(Module ID 57102-11) Explains how to determine customer needs, assess site-specific safety hazards, conduct a site survey, and identify a suitable location for the PV array and other system components. Also explains how to acquire and interpret site solar radiation and temperature data.

System Design *(25 Hours)*

Trainee $20 ISBN 978-0-13-266203-1
Instructor $20 ISBN 978-0-13-266208-6
(Module ID 57103-11) Describes system design considerations, including array configurations, component selection, and wire sizing. Covers bonding, grounding, and the selection of overcurrent protection and disconnects.

System Installation and Inspection *(60 Hours)*

Trainee $20 ISBN 978-0-13-266204-8
Instructor $20 ISBN 978-0-13-266209-3
(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 ISBN 978-0-13-266205-5
Instructor $20 ISBN 978-0-13-266210-9
(Module ID 57105-11) Covers basic system performance monitoring and troubleshooting procedures, including record-keeping requirements.

Sustainable Construction

Sustainable Construction Supervisor

20 Hours
Published: 2011
Module ID 70201-11

PAPERBACK	ISBN
Trainee Guide: $53	978-0-13-215415-4
Instructor's Guide: $53	978-0-13-215416-9

- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

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

GBCI CMP

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.

Your Role in the Green Environment

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

PAPERBACK	ISBN
Trainee Guide: $30	978-0-13-294863-0
Instructor's Guide: $30	978-0-13-294930-9

- New printed Instructor's Guide includes lesson plans and instructor's copy of Trainee Guide with an access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

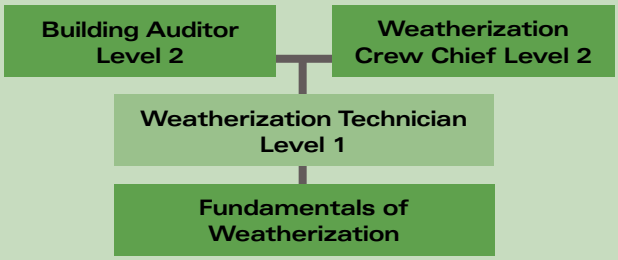
Geared to entry-level craft workers, *Your Role in the Green Environment* provides pertinent information concerning the green environment, construction practices, and building rating systems. This edition has been updated to reflect LEED v4 with emphasis on standards for building design and construction. 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.

As energy efficiency is becoming a priority for homeowners across America, many are turning to the weatherization industry to assist in their efforts. NCCER's *Weatherization* program offers training that exceeds the existing standards for weatherization technicians, crew chiefs, and building auditors. This program combines existing NCCER curricula with new building science modules that address the specific needs of this industry. Dual credentials are available within this program. *Note: Instructors wishing to teach NCCER's Weatherization program must meet specific qualifications. For more information, contact NCCER Customer Service at 1-888-622-3720.*



Introduction to Weatherization

17.5 Hours
Published: 2010
Module ID 59101-10

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

GBCI CMP

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.

- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

FUNDAMENTALS OF WEATHERIZATION

Curriculum Notes

- 90 Hours
- Published: 2010
- *Introduction to Weatherization,* combined with NCCER's *Core Curriculum,* makes up *Fundamentals of Weatherization* and is intended to introduce trainees to the concepts and skills they will need to successfully complete *Weatherization Technician Level One.* See page 11 for detailed contents of *Core Curriculum.*

PAPERBACK	ISBN
Trainee Guide: $67	978-0-13-237661-7
Instructor's Guide: $67	978-0-13-237659-4

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

L1 WEATHERIZATION TECHNICIAN

LEVEL 1

Curriculum Notes

- 145 Hours (Includes 90 hours of *Fundamentals of Weatherization* which is a prerequisite for Level One completion and must be purchased separately.)
- Published: 2010
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $67	978-0-13-256957-6
Instructor's Guide: $67	978-0-13-256984-2

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.

Wood and Masonry Construction Methods
(12.5 Hours)
(Module ID 33102-10; *from EST Level One*)
Trainee $20 ISBN 978-0-13-257038-1
Instructor $20 ISBN 978-0-13-257039-8

Thermal & Moisture Protection *(7.5 Hours)*
(Module ID 27203-07; *from Carpentry Level Two*)
Trainee $20 ISBN 978-0-13-257040-4
Instructor $20 ISBN 978-0-13-257041-1

Sealing the Building Envelope *(25 Hours)*
Trainee $20 ISBN 978-0-13-256068-9
Instructor $20 ISBN 978-0-13-256069-6
(Module ID 59102-10) Describes how to correct heat losses and gains by applying insulating materials to uninsulated areas of the building envelope. Describes how to reduce air infiltration by applying caulks and other materials. Also explains how to patch drywall and install weatherstripping.

Insulating Pipes, Ducts, and Water Heaters
(10 Hours)
Trainee $20 ISBN 978-0-13-256070-2
Instructor $20 ISBN 978-0-13-256071-9
(Module ID 59103-10) Describes how to insulate water pipes and water heaters, and explains how to make simple duct system repairs, seal air leaks in a duct system, and insulate ducts to reduce heat loss.

L2 WEATHERIZATION CREW CHIEF

LEVEL 2

Curriculum Notes

- 162.5 Hours
- Published: 2011
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-257674-1
Instructor's Guide: $97	978-0-13-257678-9

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.

Concrete and Steel Construction Methods
(12.5 Hours)
(Module ID 33103-10; *from EST Level One*)
Trainee $20 ISBN 978-0-13-266284-0
Instructor $20 ISBN 978-0-13-266295-6

Commercial Drawings *(25 Hours)*
(Module ID 27201-07; *from Carpentry Level Two*)
Trainee $20 ISBN 978-0-13-266285-7
Instructor $20 ISBN 978-0-13-266296-3

Introduction to Supervisory Skills *(15 Hours)*
(Module ID 03410-09; *from HVAC Level Four*)
Trainee $20 ISBN 978-0-13-266286-4
Instructor $20 ISBN 978-0-13-266298-7

Introduction to Cooling *(30 Hours)*
(Module ID 03107-07; *from HVAC Level One*)
Trainee $20 ISBN 978-0-13-266287-1
Instructor $20 ISBN 978-0-13-266299-4

Introduction to Heating *(15 Hours)*
(Module ID 03108-07; *from HVAC Level One*)
Trainee $20 ISBN 978-0-13-266288-8
Instructor $20 ISBN 978-0-13-266300-7

Chimneys, Vents, and Flues *(5 Hours)*
(Module ID 03202-07; *from HVAC Level Two*)
Trainee $20 ISBN 978-0-13-266292-5
Instructor $20 ISBN 978-0-13-266303-8

Air Distribution Systems *(10 Hours)*
(Module ID 03109-07; *from HVAC Level One*)
Trainee $20 ISBN 978-0-13-266291-8
Instructor $20 ISBN 978-0-13-266302-1

Air Quality Equipment *(5 Hours)* (Module ID 03204-07; *from HVAC Level Two*)
Trainee $20 ISBN 978-0-13-266314-4
Instructor $20 ISBN 978-0-13-266324-3

Indoor Air Quality *(15 Hours)*
(Module ID 03403-09; *from HVAC Level Four*)
Trainee $20 ISBN 978-0-13-266293-2
Instructor $20 ISBN 978-0-13-266304-5

Diagnostics and Management Practices *(30 Hours)*
Trainee $20 ISBN 978-0-13-266294-9
Instructor $20 ISBN 978-0-13-266306-9
(Module ID 59201-10) Explains how to interpret energy audit reports and how to prioritize and schedule air sealing. Describes how to perform the following tests: blower door, pressure pan, burner efficiency, carbon monoxide, draft, and spillage. Also covers lead-safe work practices and how to perform quality inspections on completed work.

L2 BUILDING AUDITOR

LEVEL 2

Curriculum Notes

- 172.5 Hours
- Published: 2011
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-257675-8
Instructor's Guide: $97	978-0-13-257683-3

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.

Trade Mathematics *(10 Hours)*
(Module ID 03102-07; *from HVAC Level One*)
Trainee $20 ISBN 978-0-13-266307-6
Instructor $20 ISBN 978-0-13-266317-5

Introduction to Cooling *(30 Hours)*
(Module ID 03107-07; *from HVAC Level One*)
Trainee $20 ISBN 978-0-13-266287-1
Instructor $20 ISBN 978-0-13-266299-4

Introduction to Heating *(15 Hours)*
(Module ID 03108-07; *from HVAC Level One*)
Trainee $20 ISBN 978-0-13-266288-8
Instructor $20 ISBN 978-0-13-266300-7

Chimneys, Vents, and Flues *(5 Hours)*
(Module ID 03202-07; *from HVAC Level Two*)
Trainee $20 ISBN 978-0-13-266292-5
Instructor $20 ISBN 978-0-13-266303-8

Introduction to Hydronic Systems *(10 Hours)*
(Module ID 03203-07; *from HVAC Level Two*)
Trainee $20 ISBN 978-0-13-266312-0
Instructor $20 ISBN 978-0-13-266323-6

Heating and Cooling System Design *(25 Hours)*
(Module ID 03407-09; *from HVAC Level Four*)
Trainee $20 ISBN 978-0-13-266311-3
Instructor $20 ISBN 978-0-13-266322-9

Energy Conservation Equipment *(10 Hours)*
(Module ID 03404-09; *from HVAC Level Four*)
Trainee $20 ISBN 978-0-13-266290-1
Instructor $20 ISBN 978-0-13-266301-4

Indoor Air Quality *(15 Hours)*
(Module ID 03403-09; *from HVAC Level Four*)
Trainee $20 ISBN 978-0-13-266293-2
Instructor $20 ISBN 978-0-13-266304-5

Alternative Heating and Cooling Systems *(10 Hours)*
(Module ID 03409-09; *from HVAC Level Four*)
Trainee $20 ISBN 978-0-13-266316-8
Instructor $20 ISBN 978-0-13-266326-7

Performing a Building Audit *(42.5 hours)*
Trainee $20 ISBN 978-0-13-266309-0
Instructor $20 ISBN 978-0-13-266319-9
(Module ID 59202-10) Explains how to interview homeowners and educate them about saving energy in their homes. Explains how to inspect and evaluate the building envelope and HVAC systems. Describes how to perform the following tests: blower door, pressure pan, burner efficiency, carbon monoxide, draft, and spillage. Also covers lead-safe work practices, baseload energy use, and the purpose of the forms and reports a building auditor is responsible for completing.

Wind Energy

L1 WIND TURBINE MAINTENANCE TECHNICIAN

LEVEL 1

GBCI CMP

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. 83 for ordering information.)
- Volume 2: 110 Hours
- Published: 2011
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.
- *Introduction to Wind Energy* (Module ID 58101-11) has been approved for 15 general continuing education hours under GBCI's Credential Maintenance Program.

PAPERBACK	ISBN
VOLUME 1	
Trainee Guide: $32.50	978-0-13-271895-0
Instructor's Guide: $32.50	978-0-13-272049-6
VOLUME 2	
Trainee Guide: $32.50	978-0-13-271896-7
Instructor's Guide: $32.50	978-0-13-272057-1

MODULES (Volume 1)

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 $22 ISBN 978-0-13-215452-9
Instructor $22 ISBN 978-0-13-215453-6
(Module ID 58101-11) Introduces the fundamentals of generating electrical power from wind energy. A brief history of wind energy is included as well as wind science, the interception of wind energy through a rotor, and an identification of major wind turbine generator components.

Introduction to Wind Turbine Safety *(12.5 Hours)*

Trainee $20 **ISBN 978-0-13-272945-1**
Instructor $20 **ISBN 978-0-13-272958-1**

(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 **ISBN 978-0-13-272946-8**
Instructor $20 **ISBN 978-0-13-272959-8**

(Module ID 58103-11) Covers all aspects of climbing wind turbine lattice towers and tubular towers. Discusses proper climbing equipment and equipment inspection, environmental hazards, proper climbing techniques, and common wind turbine safe climbing guidelines.

Introduction to Electrical Circuits *(7.5 Hours)*

(Module ID 26103-11; from *Electrical Level One*)

Trainee $20 **ISBN 978-0-13-257810-3**
Instructor $20 **ISBN 978-0-13-266118-8**

Electrical Theory *(7.5 Hours)*

(Module ID 26104-11; from *Electrical Level One*)

Trainee $20 **ISBN 978-0-13-257811-0**
Instructor $20 **ISBN 978-0-13-266119-5**

Electrical Test Equipment *(5 Hours)*

(Module ID 26112-11; from *Electrical Level One*)

Trainee $20 **ISBN 978-0-13-257820-2**
Instructor $20 **ISBN 978-0-13-266128-7**

Electrical Wiring *(10 Hours)*

Trainee $20 **ISBN 978-0-13-272947-5**
Instructor $20 **ISBN 978-0-13-272960-4**

(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.

MODULES (Volume 2)

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)*

(Module ID 80201-11; from *Power Line Worker, Distribution Level Two*)

Trainee $20 **ISBN 978-0-13-274259-7**
Instructor $20 **ISBN 978-0-13-274266-5**

Circuit Breakers and Fuses *(10 Hours)*

Trainee $20 **ISBN 978-0-13-272948-2**
Instructor $20 **ISBN 978-0-13-272961-1**

(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 **ISBN 978-0-13-272950-5**
Instructor $20 **ISBN 978-0-13-272962-8**

(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 **ISBN 978-0-13-272951-2**
Instructor $20 **ISBN 978-0-13-272963-5**

(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 **ISBN 978-0-13-272952-9**
Instructor $20 **ISBN 978-0-13-272965-9**

(Module ID 58108-11) Presents comprehensive coverage of wind turbine fasteners and their required characteristics. Covers torque theory, torquing, tensioning, and hydraulic torquing equipment. Presents the use and care of all significant torquing and tensioning tools. The use of taps and dies is also introduced.

Introduction to Bearings *(15 Hours)*

(Module ID 32207-07; from *Industrial Maintenance Mechanic Level Two*)

Trainee $20 **ISBN 978-0-13-272954-3**
Instructor $20 **ISBN 978-0-13-272967-3**

Lubrication *(12.5 Hours)*

Trainee $20 **ISBN 978-0-13-272953-6**
Instructor $20 **ISBN 978-0-13-272966-6**

(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 **ISBN 978-0-13-272957-4**
Instructor $20 **ISBN 978-0-13-272969-7**

(Module ID 58110-11) Covers all aspects of common hydraulic systems, including fluids, system components, and pumps. Presents the principles of hydraulic system operation and the related components. Simple hydraulic system maintenance is also introduced.

GREEN TOPICS IN HVAC

GBCI CMP

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 **ISBN 978-0-13-611998-2**
Instructor's Guide: $65 **ISBN 978-0-13-611999-9**

MODULES

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

Fundamentals of Crew Leadership

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

20 Hours
To Be Revised: 2017, Third Edition; for updates on the release status, visit www.nccer.org/book-updates
Module ID 46101-11

PAPERBACK	ISBN
Trainee Guide: $43	**978-0-13-610652-4**
Instructor's Guide: $43	**978-0-13-610653-1**

- **Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.**

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.

Project Supervision

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)*

Participant $20 **ISBN 978-0-13-103666-6**
Instructor $20 **ISBN 978-0-13-103675-8**
(Module ID MT201-01) Introduces the history of the construction industry and construction organization. Covers the phases of a construction project and the role and duties of the supervisor.

Human Relations and Problem Solving *(20 Hours)*

Participant $20 **ISBN 978-0-13-103667-3**
Instructor $20 **ISBN 978-0-13-103676-5**
(Module ID MT202-01) Focuses on the communication process and developing effective communication and leadership skills. Compares problem solving to decision making. Discusses potential human relations difficulties and how to resolve them.

Safety *(7.5 Hours)*

Participant $20 **ISBN 978-0-13-103668-0**
Instructor $20 **ISBN 978-0-13-103677-2**
(Module ID MT203-01) Describes the supervisor's role in job-site safety, the true cost of accidents, and how to train and involve all employees in job safety. Includes OSHA safety inspections.

Quality Control *(5 Hours)*

Participant $20 **ISBN 978-0-13-103669-7**
Instructor $20 **ISBN 978-0-13-103678-9**
(Module ID MT204-01) Defines different types of quality control. Explains how to incorporate quality and safety through effective communication, document control, and inspections.

Contract and Construction Documents *(5 Hours)*

Participant $20 **ISBN 978-0-13-103670-3**
Instructor $20 **ISBN 978-0-13-103679-6**
(Module ID MT205-01) Teaches how to understand and interpret construction drawings, technical specifications, and as-built drawings. Includes different types of bidding, contracts, change orders, closeout documents, and more.

Document Control and Estimating *(10 Hours)*

Participant $20 **ISBN 978-0-13-103671-0**
Instructor $20 **ISBN 978-0-13-103681-9**
(Module ID MT206-01) Provides an introduction to using and maintaining document control. Defines the elements of material, labor, and equipment estimates and how to develop, organize, and look for errors in an estimate.

Planning and Scheduling *(17.5 Hours)*

Participant $20 **ISBN 978-0-13-103673-4**
Instructor $20 **ISBN 978-0-13-103682-6**
(Module ID MT207-01) Introduces stages of planning, how to implement a plan, and how to coordinate with other contractors. Includes planning resources, materials, equipment, tools, and labor. Discusses short- and long-term schedules.

Resource Control and Cost Awareness *(15 Hours)*

Participant $20 **ISBN 978-0-13-103674-1**
Instructor $20 **ISBN 978-0-13-103683-3**
(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. 65.

PROJECT MANAGEMENT

Curriculum Notes

- 115 Hours
- Revised: 2008, Second Edition
- A companion DVD with scenarios and a user's guide is available for purchase. See "Management DVD" for ordering details.
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Participant Guide: $98	**978-0-13-604486-4**
Instructor's Guide: $98	**978-0-13-604487-1**

Product Supplements

Instructor's Guide + Management DVD
ISBN 978-0-13-610624-1 $95

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.

Introduction to Project Management *(2.5 Hours)*
Participant $20 **ISBN 978-0-13-603843-6**
Instructor $20 **ISBN 978-0-13-603821-4**
(Module ID 44101-08) Introduces the role and responsibilities of project management, including technical and management skills. Presents an overview of the phases in a construction project and describes alternate project delivery methods.

Safety *(15 Hours)*
Participant $20 **ISBN 978-0-13-603844-3**
Instructor $20 **ISBN 978-0-13-603822-1**
(Module ID 44102-08) Stresses the importance of job-site safety and identifies the project manager's duties and responsibilities regarding safety. Covers loss prevention and creating a zero-accident work environment. Presents several checklists as references.

Interpersonal Skills *(12.5 Hours)*
Participant $20 **ISBN 978-0-13-603845-0**
Instructor $20 **ISBN 978-0-13-603823-8**
(Module ID 44103-08) Discusses the values and expectations of the workforce, building relationships, and satisfying stakeholders. Describes the principles of effective communication, applying the management grid, and using relationship skills to create a leadership environment. Also discusses behavioral interviewing and professional development of personnel.

Issues and Resolutions *(15 Hours)*
Participant $20 **ISBN 978-0-13-603847-4**
Instructor $20 **ISBN 978-0-13-603859-7**
(Module ID 44104-08) Describes the key elements of successful negotiations and negotiating techniques. Explains how to recognize nonverbal signals, use negotiating tools, and apply conflict resolution strategies. Identifies symptoms and barriers to solving project-related problems and applying problem-solving techniques, brainstorming, and identifying root cause consequences.

Construction Documents *(10 Hours)*
Participant $20 **ISBN 978-0-13-603848-1**
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.

Construction Planning *(10 Hours)*
Participant $20 **ISBN 978-0-13-603849-8**
Instructor $20 **ISBN 978-0-13-603862-7**
(Module ID 44106-08) Discusses the importance of formal job planning and creating a performance-based work environment. Discusses the Work Breakdown Structure (WBS) as the foundation that identifies deliverables, tasks, and time. Introduces the basics of quality control and defines the roles and responsibilities of an effective team and how to allocate resources.

Estimating and Cost Control *(15 Hours)*
Participant $20 **ISBN 978-0-13-603815-3**
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.

Scheduling *(15 Hours)*
Participant $20 **ISBN 978-0-13-603816-0**
Instructor $20 **ISBN 978-0-13-603864-1**
(Module ID 44108-08) Explains the basics of scheduling from simple to-do lists through bar charts, network diagrams, and methods of managing resources. Discusses the importance of formal schedules, job planning, and establishing priorities. Describes alternative scheduling methods.

Resource Control *(10 Hours)*
Participant $20 **ISBN 978-0-13-603817-7**
Instructor $20 **ISBN 978-0-13-603865-8**
(Module ID 44109-08) Identifies resources that must be controlled, factors that affect production control, and production control standards. Explains the project manager's role in the process. Defines production and productivity, and describes how to evaluate and improve production control and productivity.

Quality Control and Assurance *(5 Hours)*
Participant $20 **ISBN 978-0-13-603818-4**
Instructor $20 **ISBN 978-0-13-603866-5**
(Module ID 44110-08) Defines quality control and quality assurance, and stresses management's concerns about quality. Explains project quality management and how to develop an effective quality control plan. Discusses how to identify, assess, and measure weaknesses to avoid rework.

Continuous Improvement *(5 Hours)*
Participant $20 **ISBN 978-0-13-603819-1**
Instructor $20 **ISBN 978-0-13-603867-2**
(Module ID 44111-08) Describes the project manager's role in creating a culture of continuous improvement. Explains the fundamentals of a continuous improvement program and how to identify the critical problems and processes that require improvement, implement a continuous improvement process, and measure results. Emphasizes the importance of satisfying internal and external stakeholders.

Management DVD

Minor Decisions: Major Impact; How to Deal with Real Issues in Project Management

Published: 2009

DVD: $100 **ISBN 978-0-13-609093-9**

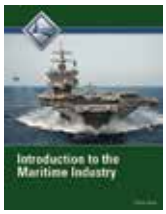
Looking for a way to stimulate class discussions about management topics? NCCER's DVD, Minor Decisions: Major Impact, provides example scenarios of issues commonly encountered by construction managers. Participants are prompted to consider how they would apply techniques they're learning in the classroom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

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

Maritime Industry Fundamentals

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

Introduction to the Maritime Industry



12.5 Hours
Published: 2013
Module ID 84101-13

PAPERBACK	ISBN
Trainee Guide: $22	**978-0-13-295443-3**
Instructor's Guide: $22	**978-0-13-294334-5**

- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

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 INDUSTRY FUNDAMENTALS

Curriculum Notes

- 100 Hours
- Published: 2013
- The Trainee and Instructor's Guides are shrinkwrapped with *Core Curriculum* and the *Introduction to the Maritime Industry* module. See page 11 for detailed contents of *Core Curriculum*.
- Either 2009 or 2015 Core can be used for the Maritime Industry Fundamentals package.
- These hours are a prerequisite for Level 1 completion of the *Maritime* programs.
- Basic Rigging (Module ID 00106-09) is required to complete *Maritime Industry Fundamentals*.
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoint® slides, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $76	**978-0-13-456850-8**
Instructor's Guide: $76	**978-0-13-456848-5**

Maritime Pipefitting

L1 MARITIME PIPEFITTING

LEVEL 1

Curriculum Notes

- 185 hours (Includes 100 hours of *Maritime Industry Fundamentals*, which is a prerequisite for Level 1 completion and must be purchased separately. See above for ordering information.)
- Published: 2013
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoint® slides, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $67	**978-0-13-340475-3**
Instructor's Guide: $67	**978-0-13-340476-0**

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 Maritime Pipefitting Trade *(5 hours)*

Trainee $20 ISBN 978-0-13-340590-3
Instructor $20 ISBN 978-0-13-340606-1
(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 $20 ISBN 978-0-13-340591-0
Instructor $20 ISBN 978-0-13-340607-8
(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 $20 ISBN 978-0-13-340592-7
Instructor $20 ISBN 978-0-13-340608-5
(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 $20 ISBN 978-0-13-340593-4
Instructor $20 ISBN 978-0-13-340609-2
(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 $20 ISBN 978-0-13-340594-1
Instructor $20 ISBN 978-0-13-340610-8
(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 is 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 $20 ISBN 978-0-13-340595-8
Instructor $20 ISBN 978-0-13-340611-5
(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.

L2 MARITIME PIPEFITTING

LEVEL 2

Curriculum Notes

- 147.5 Hours
- Published: 2013
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoint® slides, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-340478-4
Instructor's Guide: $97	978-0-13-340479-1

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.

Piping Systems *(5 hours)*
Trainee $20 ISBN 978-0-13-340596-5
Instructor $20 ISBN 978-0-13-340612-2
(Module ID 85201-13) Identifies and explains basic types of piping systems found in the maritime environment and the materials used for various applications. Explains how thermal expansion in piping systems can be accommodated. Includes coverage of common insulation types and installation practices.

Butt Weld Pipe Fabrication *(37.5 hours)*
Trainee $20 ISBN 978-0-13-340598-9
Instructor $20 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 $20 ISBN 978-0-13-340599-6
Instructor $20 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.

Brazing *(12.5 hours)*
Trainee $20 ISBN 978-0-13-340600-9
Instructor $20 ISBN 978-0-13-340616-0
(Module ID 85204-13) Describes the procedures for preparing various types of pipe and tubing for brazing, as well as the brazing process. Discusses the selection of brazing filler metals for various applications.

Threaded Pipe Fabrication *(15 hours)*
Trainee $20 ISBN 978-0-13-340601-6
Instructor $20 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.

Fiberglass and Plastic Pipe *(12.5 hours)*
Trainee $20 ISBN 978-0-13-340602-3
Instructor $20 ISBN 978-0-13- 340618-4
(Module ID 85206-13) Introduces various types of fiberglass and plastic pipe and their maritime applications. Explains how fiberglass and plastic piping materials are measured, cut, and joined.

Identifying Valves, Flanges, and Gaskets *(20 hours)*
Trainee $20 ISBN 978-0-13-340603-0
Instructor $20 ISBN 978-0-13-340619-1
(Module ID 85207-13) Describes and identifies various types of valves, flanges, and gaskets used in the maritime environment. Factors related to valve selection as well as their storage, handling, and installation are presented. The various flange styles and related gasket materials are described, as well as their common installation procedures.

Drawings and Detail Sheets *(20 hours)*
Trainee $20 ISBN 978-0-13-340604-7
Instructor $20 ISBN 978-0-13-340620-7
(Module ID 85208-13) Identifies the types and parts of drawings commonly used by maritime pipefitters. Explains how to interpret the information contained in pipe drawings to create the desired piping system.

Maritime Structural Fitter

L1 MARITIME STRUCTURAL FITTER

LEVEL 1

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. 71 for ordering information.)
- Published: 2014
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoint® slides, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $67	978-0-13-294864-7
Instructor's Guide: $67	978-0-13-294927-9

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.

Welding Safety *(2.5 Hours)*
(Module ID 29101-09; from Welding Level One)
Trainee $20 ISBN 978-0-13-610526-8
Instructor $20 ISBN 978-0-13-610505-3

Oxyfuel Cutting *(17.5 Hours)*
(Module ID 29102-09; from Welding Level One)
Trainee $20 ISBN 978-0-13-610528-2
Instructor $20 ISBN 978-0-13-610506-0

Base Metal Preparation *(12.5 Hours)*
(Module ID 29105-09; from Welding Level One)
Trainee $20 ISBN 978-0-13-610531-2
Instructor $20 ISBN 978-0-13-610545-9

Weld Quality *(10 Hours)*
(Module ID 29106-09; from Welding Level One)
Trainee $20 ISBN 978-0-13-610532-9
Instructor $20 ISBN 978-0-13-610546-6

Shielded Metal Arc Welding – Electrodes *(2.5 Hours)*
(Module ID 29108-09; from Welding Level One)
Trainee $20 ISBN 978-0-13-610534-3
Instructor $20 ISBN 978-0-13-610548-0

Tack Welding *(40 Hours)*
Trainee $20 ISBN 978-0-13-377945-5
Instructor $20 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.

Fire Watch *(5 Hours)*
Trainee $20 ISBN 978-0-13-377947-9
Instructor $20 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.

Introduction to Structural Fitter Drawings *(10 Hours)*
Trainee $20 ISBN 978-0-13-377948-6
Instructor $20 ISBN 978-0-13-377953-0
(Module ID 86103-14) Covers fundamental skills needed to read fabrication drawings that are commonly used by structural fitters. Focuses on basic drawing elements such as title blocks, revision blocks, and drawing lines and introduces plan, elevation, and detail drawings.

Fitting One *(40 Hours)*

Trainee $20 ISBN 978-0-13-377949-3
Instructor $20 ISBN 978-0-13-377954-7

(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.

L2 MARITIME STRUCTURAL FITTER

LEVEL 2

Curriculum Notes

- 227.5 Hours
- Published: 2014
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoint® slides, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-383066-8
Instructor's Guide: $97	978-0-13-383074-3

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.

Cutting and Burning Processes *(40 Hours)*

Trainee $20 ISBN 978-0-13-378724-5
Instructor $20 ISBN 978-0-13-378730-6

(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)*

Trainee $20 ISBN 978-0-13-610529-9
Instructor $20 ISBN 978-0-13-610507-7

Intermediate Structural Print Reading *(40 Hours)*

Trainee $20 ISBN 978-0-13-378725-2
Instructor $20 ISBN 978-0-13-378731-3

(Module ID 86202-14) Covers interpretation of fabrication and installation drawings, sketching of isometric and orthographic drawings, and interpretation of welding symbols.

Fitting Two *(140 Hours)*

Trainee $20 ISBN 978-0-13-378729-0
Instructor $20 ISBN 978-0-13-378735-1

(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.

L3 MARITIME STRUCTURAL FITTER

LEVEL 3

Curriculum Notes

- 237.5 Hours
- Published: 2016
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoint® slides, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-457826-2
Instructor's Guide: $97	978-0-13-457827-9

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.

Advanced Structural Print Reading *(40 Hours)*

Trainee $20 ISBN 978-0-13-414487-0
Instructor $20 ISBN 978-0-13-414488-7

(Module ID 86301-15) Focuses on learning to interpret ship construction drawings, ranging from the highest level general arrangement drawing to the lowest level piece-part drawing. Includes a set of drawings.

Fitting Three *(80 Hours)*

Trainee $20 ISBN 978-0-13-414489-4
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)*

Trainee $20 ISBN 978-0-13-214147-5
Instructor $20 ISBN 978-0-13-214121-5

GMAW and FCAW – Plate *(80 Hours)*

(Module ID 29206-09; from *Welding Level Two)*

Trainee $20 ISBN 978-0-13-214113-0
Instructor $20 ISBN 978-0-13-214157-4

Physical Characteristics and Mechanical Properties of Metals *(7.5 Hours)*

(Module ID 29203-09; from *Welding Level Two)*

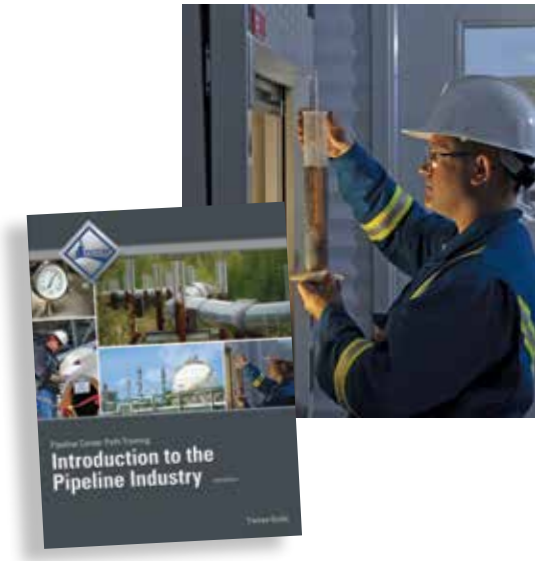
Trainee $20 ISBN 978-0-13-214145-1
Instructor $20 ISBN 978-0-13-214119-2

Fundamentals of Crew Leadership *(20 Hours)*

(Module ID 46101-11; see p. 69)

Trainee $43 ISBN 978-0-13-414493-1
Instructor $43 ISBN 978-0-13-414492-4

NCCER Pipeline Program



NCCER is excited to present its enhanced pipeline program to be released on March 30, 2017. The NCCER Pipeline Program is designed to meet the diverse needs of the industry. Whether you are looking for covered task modules with knowledge and performance exams to meet operator qualifications, 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 74 – 79 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) begin on page 79 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 (Pipeline Covered Task Instructor Access Code Card, ISBN 978-0-13-471655-8)."

All ISBNs and further ordering information are available on the NCCER Bookstore at www.nccer.org/pipeline-program.

Pipeline Career Pathway Training

Entry-level Pipeline Craft Trainee → **Pipeline Fundamentals** → **Level 1**

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 Two and Three are comprised of covered task training modules that can lead to operator qualifications. *Pipeline Corrosion Control is the only exception, providing covered task training beginning in Level One.*

The blue boxes denote the professional credential that can be earned with the successful completion of each program.

A trained workforce is a safe and qualified workforce!

Core Curriculum
pg. 11

Introduction to the Pipeline Industry

and

a.) Field Abnormal Operating Conditions
Module: AOCFG-17

or

b.) Control Center Abnormal Operating Conditions
Module: AOCCC_17

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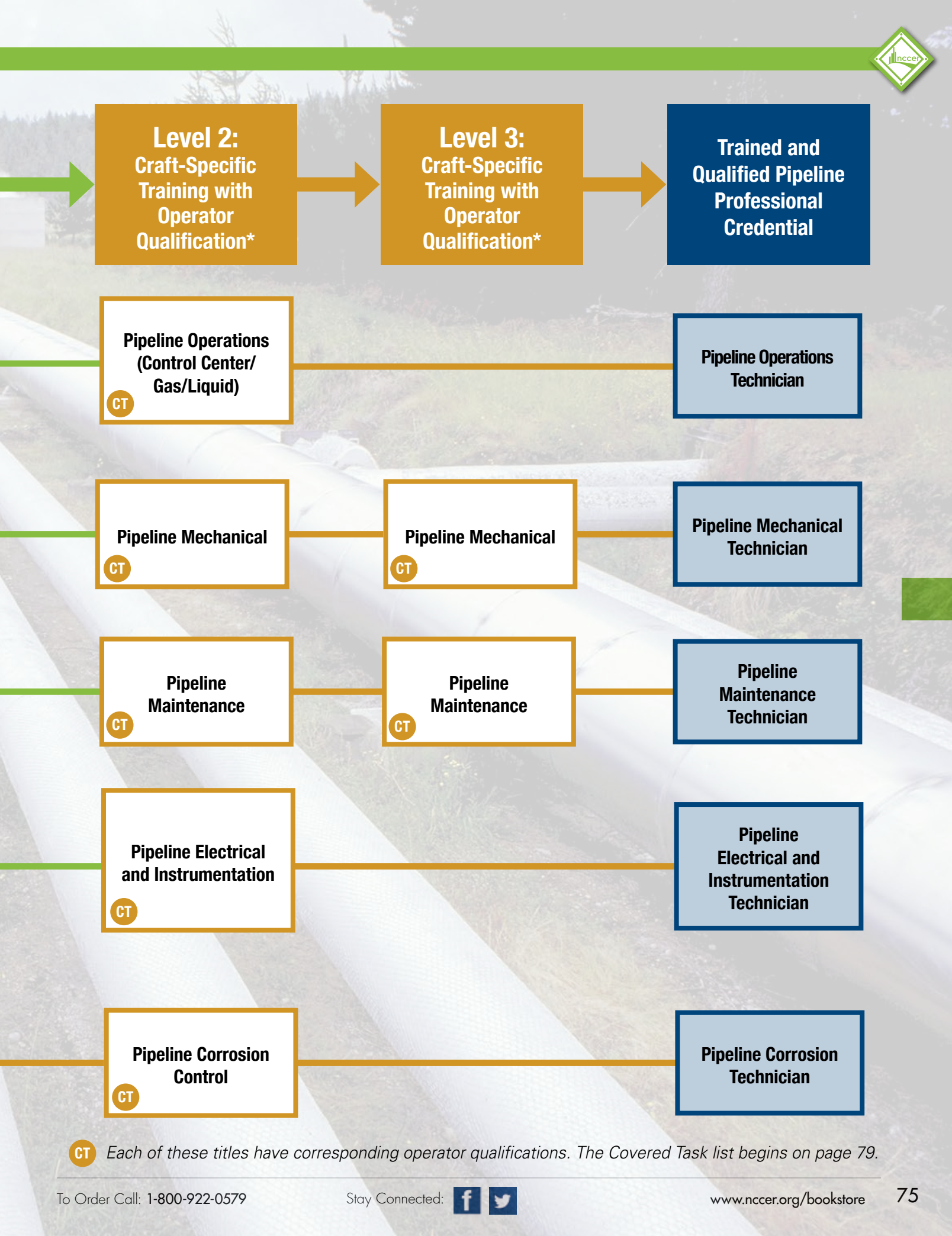
Field and Control Center Operations
pg. 79

Pipeline Maintenance and Mechanical
pg. 78

Electrical and Instrumentation
pg. 77

Pipeline Corrosion Control
CT



CT *Each of these titles have corresponding operator qualifications. The Covered Task list begins on page 79.*

Introduction to the Pipeline Industry

INTRODUCTION TO THE PIPELINE INDUSTRY

Curriculum Notes

- 100 Hours
- To Be Released: 2017, Third Edition
- *Core Curriculum* is a prerequisite to most Level 1 completions and must be purchased separately.
- Instructor's Package includes access to lesson plans, PowerPoints®, and performance exams available from the Instructor Resource Center at www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $100	978-0-13-480566-5
Instructor's Guide: $100	978-0-13-479539-3

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.

Introduction to the Pipeline Industry *(15 Hours)*
Trainee $20 ISBN 978-0-13-038223-8
Instructor $20 ISBN 978-0-13-038234-4
(Module ID 66101-02) Introduces the pipeline industry, including pipeline products and flow paths, maps and drawings used in the industry, and basic pipeline operations. Also covers hydraulics, pipeline equipment, electrical power systems, and corrosion control. Regulations, documentation, and pipeline industry occupations are also described.

Tools of the Trade *(7.5 Hours)*
Trainee $20 ISBN 978-0-13-415137-3
Instructor Package $20 ISBN 978-0-13-415258-5
(Module ID 62104-02) Explains use and care of hand and power tools used in the pipeline industry. Describes the use of welding equipment and meters and testers. Also discusses nondestructive testing and the uses of hydraulic cranes and heavy excavating equipment.

Introduction to Pipeline Documents *(5 Hours)*
Trainee $20 ISBN 978-0-13-415138-0
Instructor Package $20 ISBN 978-0-13-415259-2
(Module ID 62105-02) Identifies alignment sheets used in the pipeline industry including maps, P&IDs, and electrical drawings. Also describes the types of documentation and document management required in the industry.

Basic Pipeline Pneumatics and Equipment *(10 Hours)*
Trainee $20 ISBN 978-0-13-038244-3
Instructor $20 ISBN 978-0-13-038251-1
(Module ID 67102-02) Introduces the basics of pneumatic equipment. Topics include pneumatic safety and the physical characteristics of gas. A discussion of compressors, valves, meters, and other pipeline equipment and an overview on pipeline design also are included.

Basic Pipeline Hydraulics and Equipment *(10 Hours)*
Trainee $20 ISBN 978-0-13-038226-9
Instructor $20 ISBN 978-0-13-038236-8
(Module ID 60102-02) Explains pipeline hydraulics safety, basic principles of hydraulic systems, hydraulic properties of petroleum products, pipeline design factors, and basic pipeline equipment.

Pipeline Communications *(7.5 Hours)*
Trainee $20 ISBN 978-0-13-038227-6
Instructor $20 ISBN 978-0-13-038237-5
(Module ID 60103-02) Introduces channels of communications that must exist in pipeline operations, including internal communications with scheduling, operations, and maintenance; and external communications with contractors, the general public, regulatory agencies, and local, state, and federal government.

Pipeline Operations *(40 Hours)*
Trainee $20 ISBN 978-0-13-038370-9
Instructor $20 ISBN 978-0-13-038389-1
(Module ID 64106-02) Describes pipeline system hydraulics and ASME ratings and standards. Discusses station control systems and recognizing and responding to AOCs. Also covers pigging operations and proving process meters.

Release Identification and Response *(5 Hours)*
Trainee $20 ISBN 978-0-13-415136-6
Instructor $20 ISBN 978-0-13-415256-1
(Module ID 62103-02) Describes company environmental manuals and the DNR and EPA regulations. Explains the NRC and Coast Guard responsibilities and spill prevention. Covers soil contamination, release reporting and containment, hydrostatic testing, flaring/venting, and trash handling.

Abnormal Operating Conditions

Abnormal Operating Conditions Field & Gas

10 Hours
Revised: 2017, 2nd Edition
Module ID AOCFG-17

Print: $20
Digital through VitalSource: $18
- *For information on how to order through VitalSource, visit www.nccer.org/ pipeline-program.*

Provides an overview of the types of abnormal operating conditions (AOCs) that may occur on the pipeline or in company facilities. Appropriate responses to AOCs are covered with a focus on following company policy to protect lives and pipeline equipment. Also covered are the reports required by federal law.

or

Abnormal Operating Conditions Control Center

10 Hours
Revised: 2017, 2nd Edition
Module ID AOCCC-17

Print: $20
Digital through VitalSource: $18
- *For information on how to order through VitalSource, visit www.nccer.org/ pipeline-program.*

Introduces the abnormal operating conditions that can occur on a pipeline or in a pipeline facility. Explains how to recognize and react to abnormal operating conditions from the control center and the necessary documentation and notifications that must be completed when responding to these conditions.

V1 PIPELINE ELECTRICAL AND INSTRUMENTATION

VOLUME 1

Curriculum Notes

- Volume 1: 240 Hours
- Volume 2: 240 Hours
- To Be Released: 2017, Third Edition
- Instructor's Package includes access to lesson plans, PowerPoints®, and performance exams available from the Instructor Resource Center at www.nccerirc.com.

PAPERBACK	ISBN
VOLUME 1	
Trainee Guide: $100	**978-0-13-480564-1**
Instructor's Guide: $100	**978-0-13-479537-9**
VOLUME 2	
Trainee Guide: $100	**978-0-13-480565-8**
Instructor's Guide: $100	**978-0-13-479538-6**

MODULES (Volume 1)

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.

Pipeline E&I Safety *(15 Hours)*
Trainee $20 **ISBN 978-0-13-038376-1**
Instructor $20 **ISBN 978-0-13-038385-3**
(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 **ISBN 978-0-13-038377-8**
Instructor $20 **ISBN 978-0-13-038386-0**
(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 **ISBN 978-0-13-038378-5**
Instructor $20 **ISBN 978-0-13-038387-7**
(Module ID 64104-02) Introduces the electrical concepts used in Ohm's law as applied to DC series circuits. Discusses atomic theory, electromotive force, resistance, and electric power equations. Also introduces series, parallel, and series-parallel circuits. Covers resistive circuits, Kirchhoff's voltage and current laws, and circuit analysis.

Tools of the Trade *(15 Hours)*
Trainee $20 **ISBN 978-0-13-038379-2**
Instructor $20 **ISBN 978-0-13-038388-4**
(Module ID 64105-02) Identifies hand tools used in the pipeline E&I trade. Also explains trade-specific power tools, test equipment, and communication equipment.

Pipeline E&I Drawings *(30 Hours)*
Trainee $20 **ISBN 978-0-13-038382-2**
Instructor $20 **ISBN 978-0-13-038380-8**
(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 **ISBN 978-0-13-038383-9**
Instructor $20 **ISBN 978-0-13-038391-4**
(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 **ISBN 978-0-13-038384-6**
Instructor $20 **ISBN 978-0-13-038392-1**
(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 **ISBN 978-0-13-038393-8**
Instructor $20 **ISBN 978-0-13-038404-1**
(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 **ISBN 978-0-13-038394-5**
Instructor $20 **ISBN 978-0-13-038405-8**
(Module ID 64202-02) Explains general, personal, and test equipment for E&I safety. Covers measuring current, voltage, and resistance and the 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 **ISBN 978-0-13-038395-2**
Instructor $20 **ISBN 978-0-13-038406-5**
(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.

MODULES (VOLUME 2)

Process Control Theory *(40 Hours)*
Trainee $20 **ISBN 978-0-13-038396-9**
Instructor $20 **ISBN 978-0-13-038408-9**
(Module ID 64204-02) Explains process characteristics and control systems. Describes control loop components and control loops and modes. Discusses types of control applications, including temperature, pressure, flow, and level control.

Supervisory Control Systems *(15 Hours)*
Trainee $20 **ISBN 978-0-13-038397-6**
Instructor $20 **ISBN 978-0-13-038409-6**
(Module ID 64205-02) Explains pipeline supervisory control systems, PLCs, HMIs, and RTUs. Describes data highways and protocols, including data transfer methods, and SCADA-related communications, including transfer media, wireless radios, and Ethernet, and transmission and interface methods.

Transformers *(25 Hours)*
Trainee $20 **ISBN 978-0-13-103140-1**
Instructor $20 **ISBN 978-0-13-103148-7**
(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.

Switchgear and MCCs *(25 Hours)*
Trainee $20 **ISBN 978-0-13-103141-8**
Instructor $20 **ISBN 978-0-13-103149-4**
(Module ID 64302-02) Explains power factor and medium versus low-voltage cable and MCCs. Describes types of switchgear and cables, feeders, bussing, and bracing. Includes testing and maintenance on switchgear and MCCs and associated components.

Low-Voltage and Standby Power *(25 Hours)*
Trainee $20 **ISBN 978-0-13-103142-5**
Instructor $20 **ISBN 978-0-13-103150-0**
(Module ID 64303-02) Explains pipeline system standby generators, batteries, chargers, inverters, converters, and rotary and static UPSs. Also addresses the maintenance and testing of each.

Power Quality *(25 Hours)*
Trainee $20 **ISBN 978-0-13-103143-2**
Instructor $20 **ISBN 978-0-13-103152-4**
(Module ID 64304-02) Explains power quality and types of defects, power systems, protection, and conditioning equipment. Discusses types of electrical noise and related problems, and possible solutions. Describes static electricity and its effect, system verification testing, and equipment maintenance.

Prime Movers *(32.5 Hours)*
Trainee $20 **ISBN 978-0-13-103145-6**
Instructor $20 **ISBN 978-0-13-103153-1**
(Module ID 64305-02) Describes various electric motors and drives and their components. Discusses their maintenance and testing. Explains engine types, cooling and lubrication systems, turbine operation, fuel sources, and controls.

Facility Auxiliary Systems *(22.5 Hours)*
Trainee $20 **ISBN 978-0-13-103146-3**
Instructor $20 **ISBN 978-0-13-103154-8**
(Module ID 64306-02)Includes information on pipeline facility buildings and related systems, including fire, security, vapor recovery, injection, water treatment, cathodic protection, and blending systems.

SCADA *(30 Hours)*
Trainee $20 **ISBN 978-0-13-103147-0**
Instructor $20 **ISBN 978-0-13-103155-5**
(Module ID 64307-02) Explains pipeline operations systems, including control, communications, SCADA, and PLCs. Explains redundant systems and control system troubleshooting.

V1 PIPELINE MAINTENANCE AND MECHANICAL

VOLUME 1

Curriculum Notes

- Volume 1: 140 Hours
- Volume 2: 205 Hours
- To Be Released: 2017, Third Edition
- Instructor's Package includes access to lesson plans, PowerPoints®, and performance exams available from the Instructor Resource Center at www.nccerirc.com.

PAPERBACK	ISBN
VOLUME 1	
Trainee Guide: $100	978-0-13-480568-9
Instructor's Guide: $100	978-0-13-479534-8
VOLUME 2	
Trainee Guide: $100	978-0-13-480569-6
Instructor's Guide: $100	978-0-13-479535-5

MODULES (Volume 1)

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.

Pipeline Mechanic Hand and Power Tools *(10 Hours)*
Trainee $20 ISBN 978-0-13-038336-5
Instructor $20 ISBN 978-0-13-038343-3
(Module ID 63103-02) Introduces hand and power tools used to maintain and install pipeline equipment. Discusses tool safety and procedures for selecting, inspecting, using, and maintaining the tools.

Piping and Mechanical Blueprint Reading *(15 Hours)*
Trainee $20 ISBN 978-0-13-038337-2
Instructor $20 ISBN 978-0-13-038344-0
(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.

Tubing, Threaded Pipe, and Hoses *(30 Hours)*
Trainee $20 ISBN 978-0-13-038338-9
Instructor $20 ISBN 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.

Fasteners *(10 Hours)*
Trainee $20 ISBN 978-0-13-038339-6
Instructor $20 ISBN 978-0-13-038346-4
(Module ID 63106-02) Covers installation procedures for threaded, nonthreaded, and insulation fasteners used in the pipeline industry.

Installing Seals and Gaskets *(10 Hours)*
Trainee $20 ISBN 978-0-13-038342-6
Instructor $20 ISBN 978-0-13-038340-2
(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 ISBN 978-0-13-038351-8
Instructor $20 ISBN 978-0-13-038363-1
(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 ISBN 978-0-13-038352-5
Instructor $20 ISBN 978-0-13-038364-8
(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 ISBN 978-0-13-038353-2
Instructor $20 ISBN 978-0-13-038366-2
(Module ID 63203-02) Introduces specialty tools and precision measuring tools and explains how to select, inspect, use, and care for these tools.

Introduction to Metering Devices and Provers *(10 Hours)*
Trainee $20 ISBN 978-0-13-038357-0
Instructor $20 ISBN 978-0-13-038369-3
(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 ISBN 978-0-13-038358-7
Instructor $20 ISBN 978-0-13-038360-0
(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 ISBN 978-0-13-038359-4
Instructor $20 ISBN 978-0-13-038371-6
(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.

MODULES (VOLUME 2)

Tank Repair *(40 Hours)*
Trainee $20 ISBN 978-0-13-103162-3
Instructor $20 ISBN 978-0-13-103173-9
(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 nozzles, manways, and sumps.

Install and Maintain Bearings *(15 Hours)*
Trainee $20 ISBN 978-0-13-038350-1
Instructor $20 ISBN 978-0-13-038373-0
(Module ID 63209-02) Identifies friction and antifriction bearings, bearing materials, and bearing designation. Gives procedures to remove, troubleshoot, and install bearings.

Install Mechanical Seals *(20 Hours)*
Trainee $20 ISBN 978-0-13-038361-7
Instructor $20 ISBN 978-0-13-038374-7
(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 ISBN 978-0-13-038362-4
Instructor $20 ISBN 978-0-13-038375-4
(Module ID 63211-02) Identifies types of drivers that provide power to rotating equipment on pipelines. Explains how to inspect and replace drivers, replace bearings and seals, and perform preventive maintenance.

Install Rotating Equipment *(25 Hours)*
Trainee $20 ISBN 978-0-13-103178-4
Instructor $20 ISBN 978-0-13-103188-3
(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 ISBN 978-0-13-103179-1
Instructor $20 ISBN 978-0-13-103189-0
(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 ISBN 978-0-13-103180-7
Instructor $20 ISBN 978-0-13-106190-3
(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 ISBN 978-0-13-103181-4
Instructor $20 ISBN 978-0-13-103191-3
(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 ISBN 978-0-13-103182-1
Instructor $20 ISBN 978-0-13-103192-0

(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 ISBN 978-0-13-103187-6
Instructor $20 ISBN 978-0-13-103197-5

(Module ID 63309-02) Explains how to inspect, maintain, and repair metering devices and prover systems. Also describes the waterdraw calibration procedures used to calibrate and verify the reliability of prover systems.

Pipeline Field and Control Center Operations

L1 PIPELINE FIELD AND CONTROL CENTER OPERATIONS

LEVEL 1

Curriculum Notes

- 115 Hours
- To Be Released: 2017, Third Edition
- Instructor's Package includes access to lesson plans, PowerPoints®, and performance exams available from the Instructor Resource Center at www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $100	978-0-13-480570-2
Instructor's Guide: $100	978-0-13-480837-6

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 $20 ISBN 978-0-13-038240-5
Instructor $20 ISBN 978-0-13-038257-3

(Module ID 67106-02) Focuses on the importance of quality control and accurate 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 $20 ISBN 978-0-13-038228-3
Instructor $20 ISBN 978-0-13-038238-2

(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.

Field Quality Control *(15 Hours)*

Trainee $20 ISBN 978-0-13-038231-3
Instructor $20 ISBN 978-0-13-038242-9

(Module ID 60107-02) Introduces field quality control procedures including activation of tank mixing devices, collection of product samples, product testing, pipeline switching, product blending operations, and injection of appropriate additives.

Field Measurement *(20 Hours)*

Trainee $20 ISBN 978-0-13-038232-0
Instructor $20 ISBN 978-0-13-038243-6

(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 $20 ISBN 978-0-13-038264-1
Instructor $20 ISBN 978-0-13-038273-3

(Module ID 65107-02) Explains how to activate tank mixing devices, perform product testing, and perform pipeline grade changes and tank capacity operations. Also explains how to use and inject appropriate additives, identify types of meters, maintain accurate measurement on all custody receipts, and the processes and techniques used to prove meters.

SCADA *(30 Hours)*

Trainee $20 ISBN 978-0-13-103147-0
Instructor $20 ISBN 978-0-13-103155-5

(Module ID 64307-02) Explains pipeline operations systems, including control, communications, SCADA, and PLCs. Explains redundant systems and control system troubleshooting.

Pipeline Covered Tasks

The following is a list of NCCER's 127 covered task training modules. 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.

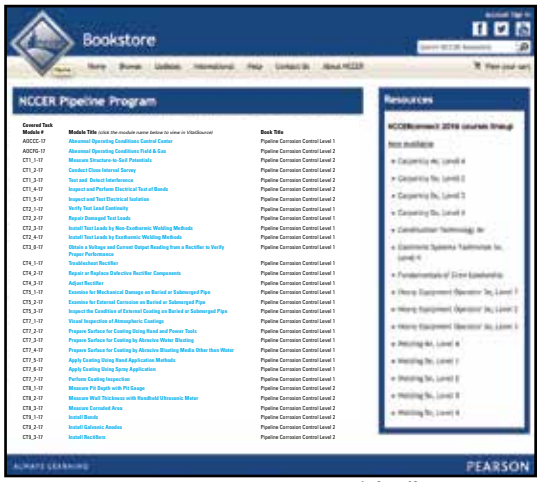
To purchase individual covered task modules in an ebook format:

- Visit www.nccer.org/pipeline-program and select the covered task you would like to purchase. This will redirect you to the VitalSource website to complete your purchase.

To purchase printed copies:

- Purchase the entire book listed in the third column of the table starting on the next page (ISBNs available at www.nccer.org/pipeline-program), OR
- Build your own custom book of modules on the Pearson Collections website at www.pearsoncollections.com.

All ISBNs and further ordering information are available on the NCCER Bookstore at www.nccer.org/bookstore.



www.nccer.org/pipeline-program

Pipeline Covered Task List (continued)

Covered Task Module #	Module Title	Book Title	ISBN
AOCCC-17	Abnormal Operating Conditions Control Center	Pipeline Corrosion Control Level 1	978-0-13-470520-0
AOCFG-17	Abnormal Operating Conditions Field & Gas	Pipeline Corrosion Control Level 2	978-0-13-471651-0
CT1_1-17	Measure Structure-to-Soil Potentials	Pipeline Corrosion Control Level 2	978-0-13-471651-0
CT1_2-17	Conduct Close Interval Survey	Pipeline Corrosion Control Level 2	978-0-13-471651-0
CT1_3-17	Test and Detect Interference	Pipeline Corrosion Control Level 2	978-0-13-471651-0
CT1_4-17	Inspect and Perform Electrical Test of Bonds	Pipeline Corrosion Control Level 2	978-0-13-471651-0
CT1_5-17	Inspect and Test Electrical Isolation	Pipeline Corrosion Control Level 2	978-0-13-471651-0
CT2_1-17	Verify Test Lead Continuity	Pipeline Corrosion Control Level 1	978-0-13-470520-0
CT2_2-17	Repair Damaged Test Leads	Pipeline Corrosion Control Level 1	978-0-13-470520-0
CT2_3-17	Install Test Leads by Non-Exothermic Welding Methods	Pipeline Corrosion Control Level 1	978-0-13-470520-0
CT2_4-17	Install Test Leads by Exothermic Welding Methods	Pipeline Corrosion Control Level 1	978-0-13-470520-0
CT3_0-17	Obtain a Voltage and Current Output Reading from a Rectifier to Verify Proper Performance	Pipeline Corrosion Control Level 1	978-0-13-470520-0
CT4_1-17	Troubleshoot Rectifier	Pipeline Corrosion Control Level 1	978-0-13-470520-0
CT4_2-17	Repair or Replace Defective Rectifier Components	Pipeline Corrosion Control Level 1	978-0-13-470520-0
CT4_3-17	Adjust Rectifier	Pipeline Corrosion Control Level 1	978-0-13-470520-0
CT5_1-17	Examine for Mechanical Damage on Buried or Submerged Pipe	Pipeline Corrosion Control Level 1	978-0-13-470520-0
CT5_2-17	Examine for External Corrosion on Buried or Submerged Pipe	Pipeline Corrosion Control Level 1	978-0-13-470520-0
CT5_3-17	Inspect the Condition of External Coating on Buried or Submerged Pipe	Pipeline Corrosion Control Level 1	978-0-13-470520-0
CT7_1-17	Visual Inspection of Atmospheric Coatings	Pipeline Corrosion Control Level 1	978-0-13-470520-0
CT7_2-17	Prepare Surface for Coating Using Hand and Power Tools	Pipeline Corrosion Control Level 1	978-0-13-470520-0
CT7_3-17	Prepare Surface for Coating by Abrasive Water Blasting	Pipeline Corrosion Control Level 1	978-0-13-470520-0
CT7_4-17	Prepare Surface for Coating by Abrasive Blasting Media Other than Water	Pipeline Corrosion Control Level 1	978-0-13-470520-0
CT7_5-17	Apply Coating Using Hand Application Methods	Pipeline Corrosion Control Level 1	978-0-13-470520-0
CT7_6-17	Apply Coating Using Spray Application	Pipeline Corrosion Control Level 1	978-0-13-470520-0
CT7_7-17	Perform Coating Inspection	Pipeline Corrosion Control Level 1	978-0-13-470520-0
CT8_1-17	Measure Pit Depth with Pit Gauge	Pipeline Corrosion Control Level 2	978-0-13-471651-0
CT8_2-17	Measure Wall Thickness with Handheld Ultrasonic Meter	Pipeline Corrosion Control Level 2	978-0-13-471651-0
CT8_3-17	Measure Corroded Area	Pipeline Corrosion Control Level 2	978-0-13-471651-0
CT9_1-17	Install Bonds	Pipeline Corrosion Control Level 2	978-0-13-471651-0
CT9_2-17	Install Galvanic Anodes	Pipeline Corrosion Control Level 2	978-0-13-471651-0
CT9_3-17	Install Rectifiers	Pipeline Corrosion Control Level 2	978-0-13-471651-0
CT9_4-17	Install Impressed Current Groundbeds	Pipeline Corrosion Control Level 2	978-0-13-471651-0
CT9_5-17	Repair Shorted Casings	Pipeline Corrosion Control Level 2	978-0-13-471651-0
CT9_6-17	Install Electrical Insulating Device	Pipeline Corrosion Control Level 2	978-0-13-471651-0
CT10_1-17	Insert and Remove Coupons	Pipeline Corrosion Control Level 2	978-0-13-471651-0
CT10_2-17	Monitor Probes (Online)	Pipeline Corrosion Control Level 2	978-0-13-471651-0
CT11_0-17	Monitoring and Controlling the Injection Rate of the Corrosion Inhibitor	Pipeline Corrosion Control Level 2	978-0-13-471651-0
CT12_0-17	Visually Inspect Internal Pipe Surface	Pipeline Corrosion Control Level 1	978-0-13-470520-0
CT14_1-17	Locate Line	Pipeline Maintenance Level 3	978-0-13-471652-7
CT14_2-17	Install, Inspect, and Maintain Permanent Marker	Pipeline Maintenance Level 3	978-0-13-471652-7
CT14_5-17	Install, Inspect, and Maintain Temporary Marker	Pipeline Maintenance Level 3	978-0-13-471652-7
CT15_1-17	Visually Inspect Surface Conditions of Right-of-Way	Pipeline Maintenance Level 2	978-0-13-471653-4
CT16_1-17	Inspect Navigable Waterway Crossing	Pipeline Maintenance Level 2	978-0-13-471653-4
CT19_1-17	Valve Body Winterization or Corrosion Inhibition	Pipeline Mechanical Level 2	978-0-13-471647-3

Pipeline Covered Task List (continued)

Covered Task Module #	Module Title	Book Title	ISBN
CT19_2-17	Valve Lubrication	Pipeline Mechanical Level 2	978-0-13-471647-3
CT19_3-17	Valve Seat Sealing	Pipeline Mechanical Level 2	978-0-13-471647-3
CT19_4-17	Valve Stem Packing Maintenance	Pipeline Mechanical Level 2	978-0-13-471647-3
CT19_5-17	Adjust Actuator/Operator, Electric	Pipeline Mechanical Level 2	978-0-13-471647-3
CT19_6-17	Adjust Actuator/Operator, Pneumatic	Pipeline Mechanical Level 2	978-0-13-471647-3
CT19_7-17	Adjust Actuator/Operator, Hydraulic	Pipeline Mechanical Level 2	978-0-13-471647-3
CT20_0-17	Inspect Main-Line Valves	Pipeline Mechanical Level 3	978-0-13-471645-9
CT21_1-17	Repair Valve Actuator/Operator, Pneumatic	Pipeline Mechanical Level 3	978-0-13-471645-9
CT21_2-17	Disassemble and Reassemble Valves	Pipeline Mechanical Level 3	978-0-13-471645-9
CT21_3-17	Internal Inspection of Valves and Components	Pipeline Mechanical Level 3	978-0-13-471645-9
CT21_4-17	Repair Valve Actuator/Operator, Hydraulic	Pipeline Mechanical Level 3	978-0-13-471645-9
CT21_5-17	Repair Valve Actuator/Operator, Electric	Pipeline Mechanical Level 3	978-0-13-471645-9
CT22_1-17	Inspect Tank Pressure/Vacuum Breakers	Pipeline Mechanical Level 3	978-0-13-471645-9
CT22_2-17	Inspect, Test, and Calibrate HVL Tank Pressure Relief Valves	Pipeline Mechanical Level 3	978-0-13-471645-9
CT23_1-17	Maintain and Repair Relief Valves	Pipeline Mechanical Level 3	978-0-13-471645-9
CT23_2-17	Inspect, Test, and Calibrate Relief Valves	Pipeline Mechanical Level 3	978-0-13-471645-9
CT24_1-17	Maintain and Repair Pressure Limiting Devices	Pipeline Mechanical Level 3	978-0-13-471645-9
CT24_2-17	Inspect, Test, and Calibrate Pressure Limiting Devices	Pipeline Mechanical Level 3	978-0-13-471645-9
CT25_1-17	Inspect, Test, and Calibrate Pressure Switches	Pipeline Electrical & Instrumentation Level 2	978-0-13-471650-3
CT25_2-17	Inspect, Test, and Calibrate Pressure Transmitters	Pipeline Electrical & Instrumentation Level 2	978-0-13-471650-3
CT26_0-17	Verify or Set Protection Parameters for Programmable Controllers and/or Other Instrumentation Control Loops	Pipeline Electrical & Instrumentation Level 2	978-0-13-471650-3
CT27_1-17	Routine Inspection of Breakout Tanks (API 653 monthly or DOT annual)	Pipeline Maintenance Level 2	978-0-13-471653-4
CT28_0-17	Provide Security for Pipeline Facilities	Pipeline Maintenance Level 2	978-0-13-471653-4
CT29_1-17	Launching In-Line Inspection Devices	Pipeline Maintenance Level 3	978-0-13-471652-7
CT29_2-17	Receiving In-Line Inspection Devices	Pipeline Maintenance Level 3	978-0-13-471652-7
CT30_0-17	Test Overfill Protective Devices	Pipeline Electrical & Instrumentation Level 2	978-0-13-471650-3
CT31_0-17	Inspect and Calibrate Overfill Protective Devices	Pipeline Electrical & Instrumentation Level 2	978-0-13-471650-3
CT32_0-17	Monitoring Excavation Activities	Pipeline Maintenance Level 2	978-0-13-471653-4
CT33_1-17	Determine Allowable Line Pressure in Section to be Moved	Pipeline Maintenance Level 3	978-0-13-471652-7
CT33_2-17	Preparation for Movement Activities	Pipeline Maintenance Level 3	978-0-13-471652-7
CT33_3-17	Moving In-Service Pipeline	Pipeline Maintenance Level 3	978-0-13-471652-7
CT34_0-17	Inspect Existing Pipe Following Movement	Pipeline Maintenance Level 2	978-0-13-471653-4
CT36_1-17	Safe Disconnect of Pipeline Facilities	Pipeline Maintenance Level 3	978-0-13-471652-7
CT36_2-17	Purging of Pipeline Facilities	Pipeline Maintenance Level 3	978-0-13-471652-7
CT36_3-17	Sealing a Disconnected Portion of Pipeline	Pipeline Maintenance Level 3	978-0-13-471652-7
CT37_0-17	Install or Repair Support Structures on Existing Above Ground Components	Pipeline Maintenance Level 2	978-0-13-471653-4
CT38_1-17	Visually Inspect Pipe and Pipe Components Prior to Installation	Pipeline Maintenance Level 2	978-0-13-471653-4
CT38_3-17	Visually Inspect that Welds Meet DOT Requirements (API 1104)	Pipeline Maintenance Level 3	978-0-13-471652-7
CT39_0-17	Backfilling a Trench Following Maintenance	Pipeline Maintenance Level 2	978-0-13-471653-4
CT40_1-17	Fit Full Encirclement Welded Split Sleeve	Pipeline Maintenance Level 3	978-0-13-471652-7
CT40_3-17	Apply Composite Sleeve	Pipeline Maintenance Level 3	978-0-13-471652-7

Covered Task Module #	Module Title	Book Title	ISBN
CT40_4-17	Install Mechanical Bolt-On Split Repair Sleeve	Pipeline Maintenance Level 3	978-0-13-471652-7
CT40_5-17	Install Weldable Compression Couplings	Pipeline Maintenance Level 3	978-0-13-471652-7
CT40_6-17	Install and Remove Plugging Machine	Pipeline Maintenance Level 3	978-0-13-471652-7
CT40_7-17	Installing a Tap 2 Inches and Under on a Pipeline System	Pipeline Maintenance Level 3	978-0-13-471652-7
CT40_8-17	Installing a Tap Larger Than 2 Inches on a Pipeline System	Pipeline Maintenance Level 3	978-0-13-471652-7
CT40_9-17	Install and Remove Completion Plug on Pipelines Larger than 2 Inches	Pipeline Maintenance Level 3	978-0-13-471652-7
CT41_0-17	Conduct Pressure Test	Pipeline Maintenance Level 3	978-0-13-471652-7
CT42_7-17	Welding	Pipeline Maintenance Level 3	978-0-13-471652-7
CT44_3-17	Inspect, Test, and Maintain Flow Computer for Hazardous Liquid Leak Detection	Pipeline Electrical & Instrumentation Level 2	978-0-13-471650-3
CT44_4-17	Inspect, Test, and Perform Corrective and Preventative Maintenance of Tank Gauging for Leak Detection	Pipeline Electrical & Instrumentation Level 2	978-0-13-471650-3
CT44_5-17	Prove Flow Meters for Hazardous Liquid Leak Detection	Pipeline Electrical & Instrumentation Level 2	978-0-13-471650-3
CT44_6-17	Maintain Flow Meters for Hazardous Liquid Leak Detection	Pipeline Electrical & Instrumentation Level 2	978-0-13-471650-3
CT44_7-17	Inspect, Test and Maintain Gravitometers/Densitometers for Hazardous Liquid Leak Detection	Pipeline Electrical & Instrumentation Level 2	978-0-13-471650-3
CT44_8-17	Inspect, Test and Maintain Temperature Transmitters for Hazardous Liquid Leak Detection	Pipeline Electrical & Instrumentation Level 2	978-0-13-471650-3
CT50_0-17	Purge Gas from a Pipeline (Gas)	Pipeline Operations Level 2	978-0-13-472539-0
CT51_0-17	Purge Air from a Pipeline (Gas)	Pipeline Operations Level 2	978-0-13-472539-0
CT52_1-17	Conduct Vegetation Survey	Pipeline Maintenance Level 2	978-0-13-471653-4
CT52_2-17	Conduct a Leak Survey with a CGD	Pipeline Maintenance Level 2	978-0-13-471653-4
CT52_3-17	Conduct a Leak Survey with a Flame Ionization Unit	Pipeline Maintenance Level 2	978-0-13-471653-4
CT54_0-17	Test Remotely Controlled Shutdown Devices (Gas)	Pipeline Operations Level 2	978-0-13-472539-0
CT55_0-17	Maintain Fixed Gas Detection Equipment	Pipeline Electrical & Instrumentation Level 2	978-0-13-471650-3
CT56_0-17	Perform Incremental Pressure Increases to Uprate the MAOP (Gas)	Pipeline Operations Level 2	978-0-13-472539-0
CT57_0-17	Operate Odorant Equipment	Pipeline Operations Level 2	978-0-13-472539-0
CT58_0-17	Monitor Odorant Level	Pipeline Operations Level 2	978-0-13-472539-0
CT59_0-17	Vault Maintenance (Gas)	Pipeline Maintenance Level 2	978-0-13-471653-4
CT63_1-17	Start-up of a Liquid Pipeline (Field)	Pipeline Operations Level 2	978-0-13-472539-0
CT63_2-17	Shutdown of a Liquid Pipeline (Field)	Pipeline Operations Level 2	978-0-13-472539-0
CT63_3-17	Monitor Pressures, Flows, Communications, and Line Integrity and Maintain them Within Allowable Limits on a Liquid Pipeline System (Field)	Pipeline Operations Level 2	978-0-13-472539-0
CT63_4-17	Locally Operate Valves on a Liquid Pipeline System	Pipeline Operations Level 2	978-0-13-472539-0
CT64_1-17	Start-up of a Liquid Pipeline (Control Center)	Pipeline Operations Level 2	978-0-13-472539-0
CT64_2-17	Shutdown of a Liquid Pipeline (Control Center)	Pipeline Operations Level 2	978-0-13-472539-0
CT64_3-17	Monitor Pressures, Flows, Communications, and Line Integrity and Maintain them Within Allowable Limits on a Liquid Pipeline System (Control Center)	Pipeline Operations Level 2	978-0-13-472539-0
CT64_4-17	Remotely Operate Valves on a Liquid Pipeline System	Pipeline Operations Level 2	978-0-13-472539-0
CT65_1-17	Start-up of a Pipeline (Gas)	Pipeline Operations Level 2	978-0-13-472539-0
CT65_2-17	Shutdown of a Pipeline (Gas)	Pipeline Operations Level 2	978-0-13-472539-0
CT65_3-17	Monitor Pressures, Flows, Communications and Line Integrity and Maintain them Within Allowable Limits (Gas)	Pipeline Operations Level 2	978-0-13-472539-0
CT65_4-17	Manually or Remotely Open or Close Valves or Other Equipment (Gas)	Pipeline Operations Level 2	978-0-13-472539-0

Covered Task Module #	Module Title	Book Title	ISBN
CTCC-17	Cold Cutting	Pipeline Maintenance Level 2	978-0-13-471653-4
CTFB-17	Flange Bolting	Pipeline Maintenance Level 2	978-0-13-471653-4
CTMP-17	Mud Plugging	Pipeline Maintenance Level 2	978-0-13-471653-4
CTTB-17	Tubing	Pipeline Maintenance Level 2	978-0-13-471653-4
CTTP-17	Threaded Pipe Fabrication	Pipeline Maintenance Level 2	978-0-13-471653-4
		Pipeline Covered Task Instructor Access Code Card	978-0-13-471655-8

Power Industry Fundamentals

Introduction to the Power Industry

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

- Instructor's Guide includes access code to download TestGen software, module exams, and performance profile sheets from www.nccerirc.com.

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 INDUSTRY FUNDAMENTALS

Curriculum Notes

- 100 Hours
- Published: 2010
- The Trainee and Instructor's Guides are *Core Curriculum* shrinkwrapped with the *Introduction to the Power Industry* module. See page 10 for detailed contents of *Core Curriculum*.
- Prerequisite for *Power Generation*, *Power Line Worker*, and *Wind Turbine Maintenance Technician* programs.
- Either 2009 or 2015 Core can be used for the Power Industry Fundamentals package.

PAPERBACK	ISBN
Trainee Guide: $76	978-0-13-466829-1
Instructor's Guide: $76	978-0-13-477787-0

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
- Please note that these modules are drawn as is from other craft areas. To order modules individually, refer to the specific craft page for ISBNs.
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $67	978-0-13-215421-5
Instructor's Guide: $67	978-0-13-215422-2

MODULES

Tools of the Trade *(5 Hours)*
(Module ID 40102-07; from *Industrial Maintenance E&I Technician Level One)*
Trainee $20 — ISBN 978-0-13-614613-1
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)*
Trainee $20 — ISBN 978-0-13-614614-8
Instructor $20 — ISBN 978-0-13-614627-8

Oxyfuel Cutting *(17.5 Hours)*
(Module ID 40104-07; from *Industrial Maintenance E&I Technician Level One)*
Trainee $20 — ISBN 978-0-13-614615-5
Instructor $20 — ISBN 978-0-13-614628-5

Gaskets and Packing *(10 Hours)*
(Module ID 40105-07; from *Industrial Maintenance E&I Technician Level One)*
Trainee $20 — ISBN 978-0-13-614616-2
Instructor $20 — ISBN 978-0-13-614596-7

Craft-Related Mathematics *(15 Hours)*
(Module ID 40106-07; from *Industrial Maintenance E&I Technician Level One)*
Trainee $20 — ISBN 978-0-13-614617-9
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 — ISBN 978-0-13-614618-6
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 — ISBN 978-0-13-614619-3
Instructor $20 — ISBN 978-0-13-614599-8

Valves *(5 Hours)*
(Module ID 40109-07; from *Industrial Maintenance E&I Technician Level One)*
Trainee $20 — ISBN 978-0-13-614620-9
Instructor $20 — ISBN 978-0-13-614600-1

Introduction to Test Instruments *(7.5 Hours)*
(Module ID 40110-07; from *Industrial Maintenance E&I Technician Level One)*
Trainee $20 — ISBN 978-0-13-614621-6
Instructor $20 — ISBN 978-0-13-614601-8

Material Handling and Hand Rigging *(15 Hours)*
(Module ID 40111-07; from *Industrial Maintenance E&I Technician Level One)*
Trainee $20 — ISBN 978-0-13-614622-3
Instructor $20 — ISBN 978-0-13-614602-5

Mobile and Support Equipment *(10 Hours)*
(Module ID 40112-07; from *Industrial Maintenance E&I Technician Level One)*
Trainee $20 — ISBN 978-0-13-614623-0
Instructor $20 — ISBN 978-0-13-614639-1

Lubrication *(12.5 Hours)*
(Module ID 40113-07; from *Industrial Maintenance E&I Technician Level One)*
Trainee $20 — ISBN 978-0-13-614624-7
Instructor $20 — ISBN 978-0-13-614640-7

SMAW Equipment and Setup *(5 Hours)*
(Module ID 29107-09; from *Welding Level One)*
Trainee $20 — ISBN 978-0-13-610533-6
Instructor $20 — ISBN 978-0-13-610547-3

L2 POWER GENERATION MAINTENANCE ELECTRICIAN

LEVEL 2

Curriculum Notes

- 167.5 Hours
- Published: 2010
- Please note that these modules are drawn as is from other craft areas. To order modules individually, refer to the specific craft page for ISBNs.
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-215423-9
Instructor's Guide: $97	978-0-13-215424-6

MODULES

Industrial Safety for E&I Technicians *(12.5 Hours)*
(Module ID 40201-08; from *Industrial Maintenance E&I Technician Level Two)*
Trainee $20 ISBN 978-0-13-604701-8
Instructor $20 ISBN 978-0-13-604716-2

Managing Electrical Hazards *(12.5 Hours)*
(Module ID 26501-09; from *Electrical)*
Trainee $22 ISBN 978-0-13-608661-1
Instructor $22 ISBN 978-0-13-608663-5

Introduction to the *National Electrical Code®* *(5 Hours)*
(Module ID 40202-08; from *Industrial Maintenance E&I Technician Level Two)*
Trainee $20 ISBN 978-0-13-604702-5
Instructor $20 ISBN 978-0-13-604717-9

Electrical Theory *(15 Hours)*
(Module ID 40203-08; from *Industrial Maintenance E&I Technician Level Two)*
Trainee $20 ISBN 978-0-13-604704-9
Instructor $20 ISBN 978-0-13-604718-6

Alternating Current *(20 Hours)*
(Module ID 40204-08; from *Industrial Maintenance E&I Technician Level Two)*
Trainee $20 ISBN 978-0-13-604705-6
Instructor $20 ISBN 978-0-13-604719-3

E&I Drawings *(10 Hours)*
(Module ID 40303-09; from *Industrial Maintenance E&I Technician Level Three)*
Trainee $20 ISBN 978-0-13-604697-4
Instructor $20 ISBN 978-0-13-604747-6

E&I Test Equipment *(10 Hours)*
(Module ID 40205-08; from *Industrial Maintenance E&I Technician Level Two)*
Trainee $20 ISBN 978-0-13-604706-3
Instructor $20 ISBN 978-0-13-604720-9

Conductors and Cables *(10 Hours)*
(Module ID 40212-08; from *Industrial Maintenance E&I Technician Level Two)*
Trainee $20 ISBN 978-0-13-604714-8
Instructor $20 ISBN 978-0-13-604692-9

Conductor Terminations and Splices *(10 Hours)*
(Module ID 40213-08; from *Industrial Maintenance E&I Technician Level Two)*
Trainee $20 ISBN 978-0-13-604715-5
Instructor $20 ISBN 978-0-13-604693-6

Motor Controls *(15 Hours)*
(Module ID 40304-09; from *Industrial Maintenance E&I Technician Level Three)*
Trainee $20 ISBN 978-0-13-604698-1
Instructor $20 ISBN 978-0-13-604748-3

Hydraulic Controls *(15 Hours)*
(Module ID 40311-09; from *Industrial Maintenance E&I Technician Level Three)*
Trainee $20 ISBN 978-0-13-604742-1
Instructor $20 ISBN 978-0-13-604757-5

Pneumatic Controls *(15 Hours)*
(Module ID 40312-09; from *Industrial Maintenance E&I Technician Level Three)*
Trainee $20 ISBN 978-0-13-604739-1
Instructor $20 ISBN 978-0-13-604754-4

Programmable Logic Controllers *(17.5 Hours)*
(Module ID 40409-09; from *Industrial Maintenance E&I Technician Level Four)*
Trainee $20 ISBN 978-0-13-609136-3
Instructor $20 ISBN 978-0-13-610441-4

L3 POWER GENERATION MAINTENANCE ELECTRICIAN

LEVEL 3

Curriculum Notes

- 222.5 Hours
- Published: 2010
- Please note that these modules are drawn as is from other craft areas. To order modules individually, refer to the specific craft page for ISBNs.
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-215425-3
Instructor's Guide: $97	978-0-13-215426-0

MODULES

Conductor Installations *(10 Hours)*
(Module ID 26206-08; from *Electrical Level Two)*
Trainee $20 ISBN 978-0-13-266135-5
Instructor $20 ISBN 978-0-13-266146-1

Cable Tray *(7.5 Hours)*
(Module ID 26207-08; from *Electrical Level Two)*
Trainee $20 ISBN 978-0-13-266136-2
Instructor $20 ISBN 978-0-13-266147-8

Grounding and Bonding *(15 Hours)*
(Module ID 26209-08; from *Electrical Level Two)*
Trainee $20 ISBN 978-0-13-266138-6
Instructor $20 ISBN 978-0-13-266150-8

Hand Bending *(10 Hours)*
(Module ID 40208-08; from *Industrial Maintenance E&I Technician Level Two)*
Trainee $20 ISBN 978-0-13-604709-4
Instructor $20 ISBN 978-0-13-604723-0

Machine Bending of Conduit *(15 Hours)*
(Module ID 40310-09; from *Industrial Maintenance E&I Technician Level Three)*
Trainee $20 ISBN 978-0-13-604741-4
Instructor $20 ISBN 978-0-13-604756-8

Electric Lighting *(15 Hours)*
(Module ID 26203-08; from *Electrical Level Two)*
Trainee $20 ISBN 978-0-13-266132-4
Instructor $20 ISBN 978-0-13-266143-0

Practical Applications of Lighting *(12.5 Hours)*
(Module ID 26303-08; from *Electrical Level Three)*
Trainee $20 ISBN 978-0-13-293676-7
Instructor $20 ISBN 978-0-13-293687-3

Hazardous Locations *(10 Hours)*
(Module ID 40301-09; from *Industrial Maintenance E&I Technician Level Three)*
Trainee $20 ISBN 978-0-13-604694-3
Instructor $20 ISBN 978-0-13-604744-5

Circuit Breakers and Fuses *(12.5 Hours)*
(Module ID 26210-08; from *Electrical Level Two)*
Trainee $20 ISBN 978-0-13-266139-3
Instructor $20 ISBN 978-0-13-266151-5

Transformer Applications *(7.5 Hours)*
(Module ID 40306-09; from *Industrial Maintenance E&I Technician Level Three)*
Trainee $20 ISBN 978-0-13-604735-3
Instructor $20 ISBN 978-0-13-604750-6

Distribution Equipment *(17.5 Hours)*
(Module ID 40305-09; from *Industrial Maintenance E&I Technician Level Three)*
Trainee $20 ISBN 978-0-13-604734-6
Instructor $20 ISBN 978-0-13-604749-0

Power Plant Electrical Systems *(12.5 Hours)*
Trainee $18 ISBN 978-0-13-272106-6
Instructor $18 ISBN 978-0-13-272107-3
(Module ID 50301-11) Describes how the electrical power to operate a power station is developed and distributed in normal, shutdown, and emergency situations. Covers equipment used in power stations, including circuit breakers, switchgear, and motor control centers.

Conductor Selection and Calculations *(15 Hours)*
(Module ID 40307-09; from *Industrial Maintenance E&I Technician Level Three)*
Trainee $20 ISBN 978-0-13-604736-0
Instructor $20 ISBN 978-0-13-604751-3

Motors: Theory and Application *(20 Hours)*
(Module ID 26202-08; from *Electrical Level Two)*
Trainee $20 ISBN 978-0-13-266131-7
Instructor $20 ISBN 978-0-13-266142-3

Motor-Operated Valves *(15 Hours)*
(Module ID 40313-09; from *Industrial Maintenance E&I Technician Level Three)*
Trainee $20 ISBN 978-0-13-604743-8
Instructor $20 ISBN 978-0-13-604758-2

Control Systems and Fundamental Concepts *(12.5 Hours)*
(Module ID 26211-08; from *Electrical Level Two)*
Trainee $20 ISBN 978-0-13-266140-9
Instructor $20 ISBN 978-0-13-266152-2

Temporary Grounding *(15 Hours)*
(Module ID 40308-09; from *Industrial Maintenance E&I Technician Level Three)*
Trainee $20 ISBN 978-0-13-604738-4
Instructor $20 ISBN 978-0-13-604753-7

L4 POWER GENERATION MAINTENANCE ELECTRICIAN

LEVEL 4

Curriculum Notes

- 197.5 Hours
- Published: 2011
- Please note that these modules are drawn as is from other craft areas. To order modules individually, refer to the specific craft page for ISBNs.
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

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)*
Trainee $20 ISBN 978-0-13-609290-2
Instructor $20 ISBN 978-0-13-609302-2

Motor Calculations *(12.5 Hours)*
(Module ID 26309-08; from *Electrical Level Three)*
Trainee $20 ISBN 978-0-13-609299-5
Instructor $20 ISBN 978-0-13-609276-6

Overcurrent Protection *(25 Hours)*
(Module ID 26305-08; from *Electrical Level Three)*
Trainee $20 ISBN 978-0-13-609294-0
Instructor $20 ISBN 978-0-13-609307-7

Specialty Transformers *(10 Hours)*
(Module ID 26406-08; from *Electrical Level Four)*
Trainee $20 ISBN 978-0-13-609319-0
Instructor $20 ISBN 978-0-13-609333-6

Advanced Controls *(20 Hours)*
(Module ID 26407-08; from *Electrical Level Four)*
Trainee $20 ISBN 978-0-13-609320-6
Instructor $20 ISBN 978-0-13-609334-3

Motor Operation and Maintenance *(10 Hours)*
(Module ID 26410-08; from *Electrical Level Four)*
Trainee $20 ISBN 978-0-13-609324-4
Instructor $20 ISBN 978-0-13-609337-4

Generator Maintenance *(20 Hours)*
Trainee $20 ISBN 978-0-13-266211-6
Instructor $20 ISBN 978-0-13-266213-0
(Module ID 50401-10) Covers the operating characteristics and major components of AC and DC generators. Topics include generator connection methods; voltage regulators; auxiliary systems; and maintenance procedures.

Switchgear and Breaker Maintenance *(25 Hours)*
Trainee $20 ISBN 978-0-13-266212-3
Instructor $20 ISBN 978-0-13-266215-4
(Module ID 50402-11) Reviews the safety practices associated with power station electrical work. Explains how medium-voltage and low-voltage sources are developed and used in the power station, and how the station power system functions in a blackout or shutdown situation. Also describes the circuit breakers, switchgear, and motor control centers used in power stations, and provides instructions for maintenance of these devices.

Preventive and Predictive Maintenance *(10 Hours)*
(Module ID 32401-09; from *Industrial Maintenance Mechanic Level Four)*
Trainee $20 ISBN 978-0-13-610445-2
Instructor $20 ISBN 978-0-13-610456-8

Medium Voltage Terminations/Splices *(10 Hours)*
(Module ID 26411-08; from *Electrical Level Four)*
Trainee $20 ISBN 978-0-13-609325-1
Instructor $20 ISBN 978-0-13-609338-1

Fire Alarm Systems *(15 Hours)*
(Module ID 26405-08; from *Electrical Level Four)*
Trainee $20 ISBN 978-0-13-609283-4
Instructor $20 ISBN 978-0-13-609332-9

Heat Tracing and Freeze Protection *(10 Hours)*
(Module ID 26409-08; from *Electrical Level Four)*
Trainee $20 ISBN 978-0-13-609323-7
Instructor $20 ISBN 978-0-13-609336-7

Standby and Emergency Systems *(12.5 Hours)*
(Module ID 40401-09; from *Industrial Maintenance E&I Technician Level Four)*
Trainee $20 ISBN 978-0-13-609163-9
Instructor $20 ISBN 978-0-13-609139-4

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. 83 for more information.)
- Published: 2010
- Please note that these modules are drawn as is from other craft areas. To order modules individually, refer to the specific craft page for ISBNs.
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

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 ISBN 978-0-13-614613-1
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)*
Trainee $20 ISBN 978-0-13-614614-8
Instructor $20 ISBN 978-0-13-614627-8

Oxyfuel Cutting *(17.5 Hours)*
(Module ID 40104-07; *from Industrial Maintenance E&I Technician Level One)*
Trainee $20 ISBN 978-0-13-614615-5
Instructor $20 ISBN 978-0-13-614628-5

Gaskets and Packing *(10 Hours)*
(Module ID 40105-07; from *Industrial Maintenance E&I Technician Level One)*
Trainee $20 ISBN 978-0-13-614616-2
Instructor $20 ISBN 978-0-13-614596-7

Craft-Related Mathematics *(15 Hours)*
(Module ID 40106-07; *from Industrial Maintenance E&I Technician Level One)*
Trainee $20 ISBN 978-0-13-614617-9
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 ISBN 978-0-13-614618-6
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 ISBN 978-0-13-614619-3
Instructor $20 ISBN 978-0-13-614599-8

Valves *(5 Hours)*
(Module ID 40109-07; from *Industrial Maintenance E&I Technician Level One)*
Trainee $20 ISBN 978-0-13-614620-9
Instructor $20 ISBN 978-0-13-614600-1

Introduction to Test Instruments *(7.5 Hours)*
(Module ID 40110-07; from *Industrial Maintenance E&I Technician Level One)*
Trainee $20 ISBN 978-0-13-614621-6
Instructor $20 ISBN 978-0-13-614601-8

Material Handling and Hand Rigging *(15 Hours)*
(Module ID 40111-07; from *Industrial Maintenance E&I Technician Level One)*
Trainee $20 ISBN 978-0-13-614622-3
Instructor $20 ISBN 978-0-13-614602-5

Mobile and Support Equipment *(10 Hours)*
(Module ID 40112-07; from *Industrial Maintenance E&I Technician Level One)*
Trainee $20 ISBN 978-0-13-614623-0
Instructor $20 ISBN 978-0-13-614639-1

Lubrication *(12.5 Hours)*
(Module ID 40113-07; from *Industrial Maintenance E&I Technician Level One)*
Trainee $20 ISBN 978-0-13-614624-7
Instructor $20 ISBN 978-0-13-614640-7

SMAW Equipment and Setup *(5 Hours)*
(Module ID 29107-09; from *Welding Level One)*
Trainee $20 ISBN 978-0-13-610533-6
Instructor $20 ISBN 978-0-13-610547-3

L2 POWER GENERATION I&C MAINTENANCE TECHNICIAN

LEVEL 2

Curriculum Notes

- 167.5 Hours
- Published: 2010
- Please note that these modules are drawn as is from other craft areas. To order modules individually, refer to the specific craft page for ISBNs.
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-215432-1
Instructor's Guide: $97	978-0-13-215433-8

MODULES

Industrial Safety for E&I Technicians *(12.5 Hours)*
(Module ID 40201-08; from *Industrial Maintenance E&I Technician Level Two)*
Trainee $20 ISBN 978-0-13-604701-8
Instructor $20 ISBN 978-0-13-604716-2

Managing Electrical Hazards *(12.5 Hours)*
(Module ID 26501-09; from *Electrical)*
Trainee $22 ISBN 978-0-13-608661-1
Instructor $22 ISBN 978-0-13-608663-5

Introduction to the *National Electrical Code®* *(5 Hours)*
(Module ID 40202-08; from *Industrial Maintenance E&I Technician Level Two)*
Trainee $20 ISBN 978-0-13-604702-5
Instructor $20 ISBN 978-0-13-604717-9

Electrical Theory *(15 Hours)*
(Module ID 40203-08; from *Industrial Maintenance E&I Technician Level Two)*
Trainee $20 ISBN 978-0-13-604704-9
Instructor $20 ISBN 978-0-13-604718-6

Alternating Current *(20 Hours)*
(Module ID 40204-08; from *Industrial Maintenance E&I Technician Level Two)*
Trainee $20 ISBN 978-0-13-604705-6
Instructor $20 ISBN 978-0-13-604719-3

E&I Drawings *(10 Hours)*
(Module ID 40303-09; from *Industrial Maintenance E&I Technician Level Three)*
Trainee $20 ISBN 978-0-13-604697-4
Instructor $20 ISBN 978-0-13-604747-6

E&I Test Equipment *(10 Hours)*
(Module ID 40205-08; from *Industrial Maintenance E&I Technician Level Two)*
Trainee $20 ISBN 978-0-13-604706-3
Instructor $20 ISBN 978-0-13-604720-9

Conductors and Cables *(10 Hours)*
(Module ID 40212-08; from *Industrial Maintenance E&I Technician Level Two)*
Trainee $20 ISBN 978-0-13-604714-8
Instructor $20 ISBN 978-0-13-604692-9

Conductor Terminations and Splices *(10 Hours)*
(Module ID 40213-08; from *Industrial Maintenance E&I Technician Level Two)*
Trainee $20 ISBN 978-0-13-604715-5
Instructor $20 ISBN 978-0-13-604693-6

Motor Controls *(15 Hours)*
(Module ID 40304-09; from *Industrial Maintenance E&I Technician Level Three)*
Trainee $20 ISBN 978-0-13-604698-1
Instructor $20 ISBN 978-0-13-604748-3

Hydraulic Controls *(15 Hours)*
(Module ID 40311-09; from *Industrial Maintenance E&I Technician Level Three)*
Trainee $20 ISBN 978-0-13-604742-1
Instructor $20 ISBN 978-0-13-604757-5

Pneumatic Controls *(15 Hours)*
(Module ID 40312-09; from *Industrial Maintenance E&I Technician Level Three)*
Trainee $20 ISBN 978-0-13-604739-1
Instructor $20 ISBN 978-0-13-604754-4

Programmable Logic Controllers *(17.5 Hours)*
(Module ID 40409-09; from *Industrial Maintenance E&I Technician Level Four)*
Trainee $20 ISBN 978-0-13-609136-3
Instructor $20 ISBN 978-0-13-610441-4

L3 POWER GENERATION I&C MAINTENANCE TECHNICIAN

LEVEL 3

Curriculum Notes

- 225.5 Hours
- Published: 2010
- Please note that these modules are drawn as is from other craft areas. To order modules individually, refer to the specific craft page for ISBNs.
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-215434-5
Instructor's Guide: $97	978-0-13-215436-9

MODULES

Instrumentation Electrical Circuitry *(25 Hours)*
(Module ID 12305-03; from *Instrumentation Level Three)*
Trainee $20 ISBN 978-0-13-103301-6
Instructor $20 ISBN 978-0-13-103309-2

Process Mathematics *(15 Hours)*
(Module ID 40207-08; from *Industrial Maintenance E&I Technician Level Two)*
Trainee $20 ISBN 978-0-13-604708-7
Instructor $20 ISBN 978-0-13-604722-3

Flow, Pressure, Level and Temperature *(15 Hours)*
(Module ID 40206-08; from *Industrial Maintenance E&I Technician Level Two)*
Trainee $20 ISBN 978-0-13-604707-0
Instructor $20 ISBN 978-0-13-604721-6

Instrument Drawings and Documents, Part One *(15 Hours)*
(Module ID 40211-08; from *Industrial Maintenance E&I Technician Level Two)*
Trainee $20 ISBN 978-0-13-604713-1
Instructor $20 ISBN 978-0-13-604691-2

Electrical Systems for Instrumentation *(22.5 Hours)* (Module ID 12104-01; from *Instrumentation Level One)*
Trainee $20 ISBN 978-0-13-868241-5
Instructor $20 ISBN 978-0-13-868258-3

Relays and Timers *(7.5 Hours)*
(Module ID 12208-03; from *Instrumentation Level Two)*
Trainee $20 ISBN 978-0-13-103272-9
Instructor $20 ISBN 978-0-13-103288-0

Switches and Photoelectric Devices *(5 Hours)*
(Module ID 12209-03; from *Instrumentation Level Two)*
Trainee $20 ISBN 978-0-13-103273-6
Instructor $20 ISBN 978-0-13-103289-7

Tubing *(15 Hours)*
(Module ID 40209-08; from *Industrial Maintenance E&I Technician Level Two)*
Trainee $20 ISBN 978-0-13-604710-0
Instructor $20 ISBN 978-0-13-604724-7

Clean, Purge, and Test Tubing and Piping Systems *(7.5 Hours)*
(Module ID 40210-08; from *Industrial Maintenance E&I Technician Level Two)*
Trainee $20 ISBN 978-0-13-604711-7
Instructor $20 ISBN 978-0-13-604690-5

Layout and Installation of Tubing and Piping Systems *(22.5 Hours)*
(Module ID 40309-09; from *Industrial Maintenance E&I Technician Level Three)*
Trainee $20 ISBN 978-0-13-604740-7
Instructor $20 ISBN 978-0-13-604755-1

Electronic Components *(10 Hours)*
(Module ID 40302-09; from *Industrial Maintenance E&I Technician Level Three)*
Trainee $20 ISBN 978-0-13-604696-7
Instructor $20 ISBN 978-0-13-604746-9

Panel-Mounted Instruments *(7.5 Hours)*
(Module ID 12212-03; from *Instrumentation Level Two)*
Trainee $20 ISBN 978-0-13-103277-4
Instructor $20 ISBN 978-0-13-103293-4

Installing Field-Mounted Instruments *(25 Hours)*
(Module ID 12213-03; from *Instrumentation Level Two)*
Trainee $20 ISBN 978-0-13-103278-1
Instructor $20 ISBN 978-0-13-103294-1

Grounding and Shielding of Instrumentation Wiring *(10 Hours)*
(Module ID 12306-03; from *Instrumentation Level Three)*
Trainee $20 ISBN 978-0-13-103302-3
Instructor $20 ISBN 978-0-13-103310-8

Analyzers *(20 Hours)*
(Module ID 12408-03; from *Instrumentation Level Four)*
Trainee $20 ISBN 978-0-13-109619-6
Instructor $20 ISBN 978-0-13-109629-5

L4 POWER GENERATION I&C MAINTENANCE TECHNICIAN

LEVEL 4

Curriculum Notes

- 210 Hours
- Published: 2010
- Please note that these modules are drawn as is from other craft areas. To order modules individually, refer to the specific craft page for ISBNs.
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-215437-6
Instructor's Guide: $97	978-0-13-215438-3

MODULES

Standby and Emergency Systems *(12.5 Hours)*
(Module ID 40401-09; from *Industrial Maintenance E&I Technician Level Four)*
Trainee $20 ISBN 978-0-13-609163-9
Instructor $20 ISBN 978-0-13-609139-4

Basic Process Control Elements, Transducers and Transmitters *(15 Hours)*
(Module ID 40402-09; from *Industrial Maintenance E&I Technician Level Four)*
Trainee $20 ISBN 978-0-13-609165-3
Instructor $20 ISBN 978-0-13-609140-0

Instrument Calibration and Configuration *(10 Hours)*
(Module ID 40403-09; from *Industrial Maintenance E&I Technician Level Four)*
Trainee $20 ISBN 978-0-13-609166-0
Instructor $20 ISBN 978-0-13-609141-7

Pneumatic Control Valves, Actuators and Positioners *(40 Hours)*
(Module ID 40404-09; *from Industrial Maintenance E&I Technician Level Four)*
Trainee $20 ISBN 978-0-13-609167-7
Instructor $20 ISBN 978-0-13-609142-4

Performing Loop Checks *(7.5 Hours)*
(Module ID 40405-09; from *Industrial Maintenance E&I Technician Level Four)*
Trainee $20 ISBN 978-0-13-609168-4
Instructor $20 ISBN 978-0-13-609143-1

Troubleshooting and Commissioning a Loop *(10 Hours)*
(Module ID 40406-09; from *Industrial Maintenance E&I Technician Level Four)*
Trainee $20 ISBN 978-0-13-609169-1
Instructor $20 ISBN 978-0-13-610439-1

Process Control Theory *(20 Hours)*
(Module ID 12204-03; from *Instrumentation Level Two)*
Trainee $20 ISBN 978-0-13-103267-5
Instructor $20 ISBN 978-0-13-103283-5

Process Control Loops and Tuning *(20 Hours)*
(Module ID 40407-09; from *Industrial Maintenance E&I Technician Level Four)*
Trainee $20 ISBN 978-0-13-609135-6
Instructor $20 ISBN 978-0-13-610440-7

Data Networks *(15 Hours)*
(Module ID 40408-09; from *Industrial Maintenance E&I Technician Level Four)*
Trainee $20 ISBN 978-0-13-609138-7
Instructor $20 ISBN 978-0-13-610443-8

Digital Logic Circuits *(10 Hours)*
(Module ID 12401-03; from *Instrumentation Level Four)*
Trainee $20 ISBN 978-0-13-109610-3
Instructor $20 ISBN 978-0-13-109621-9

Calibrate Supervisory Instrumentation Elements *(10 Hours)*
Trainee $20 ISBN 978-0-13-266216-1
Instructor $20 ISBN 978-0-13-266218-5
(Module ID 51401-10) Describes the sensing devices used to monitor key parameters, including vibration and speed sensors, eccentricity sensors, and thrust bearing wear detectors. Also covers the test instruments used to calibrate supervisory instrumentation, including shakers and Wobulators®, and explains how to use selected test instruments in the calibration process.

Boiler/HRSG Control *(12.5 Hours)*
Trainee $20 ISBN 978-0-13-266217-8
Instructor $20 ISBN 978-0-13-266219-2
(Module ID 51402-10) Covers the control devices, methods, and strategies used for boilers and Heat Recovery Steam Generators (HRSGs). Discusses fuel, air, oxygen, feedwater, and steam control, as well as the precautions and regulations related to burner and furnace fuel control.

Preventive and Predictive Maintenance *(10 Hours)*
(Module ID 32401-09; from *Industrial Maintenance Mechanic Level Four)*
Trainee $20 ISBN 978-0-13-610445-2
Instructor $20 ISBN 978-0-13-610456-8

Distributed Control Systems *(17.5 Hours)*
(Module ID 40410-09; from *Industrial Maintenance E&I Technician Level Four)*
Trainee $20 ISBN 978-0-13-609137-0
Instructor $20 ISBN 978-0-13-610442-1

L1 POWER GENERATION MAINTENANCE MECHANIC

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. 83 for more information.)
- Published: 2010
- Please note that these modules are drawn as is from other craft areas. To order modules individually, refer to the specific craft page for ISBNs.
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $67	978-0-13-215439-0
Instructor's Guide: $67	978-0-13-215440-6

MODULES

Tools of the Trade *(5 Hours)*
(Module ID 32102-07; from *Industrial Maintenance Mechanic Level One)*
Trainee $20 ISBN 978-0-13-614584-4
Instructor $20 ISBN 978-0-13-614564-6

Fasteners and Anchors *(5 Hours)*
(Module ID 32103-07; from *Industrial Maintenance Mechanic Level One)*
Trainee $20 ISBN 978-0-13-614585-1
Instructor $20 ISBN 978-0-13-614565-3

Oxyfuel Cutting *(17.5 Hours)*
(Module ID 32104-07; from *Industrial Maintenance Mechanic Level One)*
Trainee $20 ISBN 978-0-13-614586-8
Instructor $20 ISBN 978-0-13-614566-0

Gaskets and Packing *(10 Hours)*
(Module ID 32105-07; from *Industrial Maintenance Mechanic Level One)*
Trainee $20 ISBN 978-0-13-614588-2
Instructor $20 ISBN 978-0-13-614567-7

Craft-Related Mathematics *(15 Hours)*
(Module ID 32106-07; from *Industrial Maintenance Mechanic Level One)*
Trainee $20 ISBN 978-0-13-614589-9
Instructor $20 ISBN 978-0-13-614568-4

Construction Drawings *(12.5 Hours)*
(Module ID 32107-07; from *Industrial Maintenance Mechanic Level One)*
Trainee $20 ISBN 978-0-13-614590-5
Instructor $20 ISBN 978-0-13-614604-9

Pumps and Drivers *(5 Hours)*
(Module ID 32108-07; from *Industrial Maintenance Mechanic Level One)*
Trainee $20 ISBN 978-0-13-614591-2
Instructor $20 ISBN 978-0-13-614605-6

Valves *(5 Hours)*
(Module ID 32109-07; from *Industrial Maintenance Mechanic Level One)*
Trainee $20 ISBN 978-0-13-614592-9
Instructor $20 ISBN 978-0-13-614606-3

Introduction to Test Instruments *(7.5 Hours)*
(Module ID 32110-07; from *Industrial Maintenance Mechanic Level One)*
Trainee $20 ISBN 978-0-13-614593-6
Instructor $20 ISBN 978-0-13-614607-0

Material Handling and Hand Rigging *(15 Hours)*
(Module ID 32111-07; from *Industrial Maintenance Mechanic Level One)*
Trainee $20 ISBN 978-0-13-614594-3
Instructor $20 ISBN 978-0-13-614608-7

Mobile and Support Equipment *(10 Hours)*
(Module ID 32112-07; from *Industrial Maintenance Mechanic Level One)*
Trainee $20 ISBN 978-0-13-614560-8
Instructor $20 ISBN 978-0-13-614609-4

Lubrication *(12.5 Hours)*
(Module ID 32113-07; from *Industrial Maintenance Mechanic Level One)*
Trainee $20 ISBN 978-0-13-614562-2
Instructor $20 ISBN 978-0-13-614611-7

SMAW Equipment and Setup *(5 Hours)*
(Module ID 29107-09; from *Welding Level One)*
Trainee $20 ISBN 978-0-13-610533-6
Instructor $20 ISBN 978-0-13-610547-3

L2 POWER GENERATION MAINTENANCE MECHANIC

LEVEL 2

Curriculum Notes

- 260 Hours
- Published: 2010
- Please note that these modules are drawn as is from other craft areas. To order modules individually, refer to the specific craft page for ISBNs.
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-215441-3
Instructor's Guide: $97	978-0-13-215408-6

MODULES

Basic Layout *(20 Hours)*
(Module ID 32201-07; from *Industrial Maintenance Mechanic Level Two)*
Trainee $20 ISBN 978-0-13-604621-9
Instructor $20 ISBN 978-0-13-604668-4

Advanced Trade Math *(30 Hours)*
(Module ID 32301-08; from *Industrial Maintenance Mechanic Level Three)*
Trainee $20 ISBN 978-0-13-604681-3
Instructor $20 ISBN 978-0-13-604656-1

Precision Measuring Tools *(20 Hours)*
(Module ID 32302-08; from *Industrial Maintenance Mechanic Level Three)*
Trainee $20 ISBN 978-0-13-604682-0
Instructor $20 ISBN 978-0-13-604657-8

Introduction to Bearings *(15 Hours)*
(Module ID 32207-07; from *Industrial Maintenance Mechanic Level Two)*
Trainee $20 ISBN 978-0-13-604627-1
Instructor $20 ISBN 978-0-13-604674-5

Installing Bearings *(20 Hours)*
(Module ID 32303-08; from *Industrial Maintenance Mechanic Level Three)*
Trainee $20 ISBN 978-0-13-604683-7
Instructor $20 ISBN 978-0-13- 604658-5

Installing Couplings *(15 Hours)*
(Module ID 32304-08; from *Industrial Maintenance Mechanic Level Three)*
Trainee $20 ISBN 978-0-13-604684-4
Instructor $20 ISBN 978-0-13-604659-2

Installing Mechanical Seals *(20 Hours)*
(Module ID 32308-08; from *Industrial Maintenance Mechanic Level Three)*
Trainee $20 ISBN 978-0-13-604689-9
Instructor $20 ISBN 978-0-13-604699-8

Conventional Alignment *(30 Hours)*
(Module ID 32306-08; from *Industrial Maintenance Mechanic Level Three)*
Trainee $20 ISBN 978-0-13-604686-8
Instructor $20 ISBN 978-0-13-604662-2

Reverse Alignment *(30 Hours)*
(Module ID 32404-09; from *Industrial Maintenance Mechanic Level Four)*
Trainee $20 ISBN 978-0-13-610448-3
Instructor $20 ISBN 978-0-13-610459-9

Laser Alignment *(25 Hours)*
(Module ID 32405-09; from *Industrial Maintenance Mechanic Level Four)*
Trainee $20 ISBN 978-0-13-610449-0
Instructor $20 ISBN 978-0-13-610460-5

Installing Belt and Chain Drives *(10 Hours)*
(Module ID 32307-08; from *Industrial Maintenance Mechanic Level Three)*
Trainee $20 ISBN 978-0-13-604688-2
Instructor $20 ISBN 978-0-13-604663-9

Introduction to Piping Components *(5 Hours)*
(Module ID 32202-07; from *Industrial Maintenance Mechanic Level Two)*
Trainee $20 ISBN 978-0-13-604622-6
Instructor $20 ISBN 978-0-13-604669-1

Copper and Plastic Piping Practices *(5 Hours)*
(Module ID 32203-07; from *Industrial Maintenance Mechanic Level Two)*
Trainee $20 ISBN 978-0-13-604623-3
Instructor $20 ISBN 978-0-13-604670-7

Introduction to Ferrous Metal Piping Practices *(5 Hours)*
(Module ID 32204-07; from *Industrial Maintenance Mechanic Level Two)*
Trainee $20 ISBN 978-0-13-604624-0
Instructor $20 ISBN 978-0-13-604671-4

Identify, Install and Maintain Valves *(10 Hours)*
(Module ID 32205-07; from *Industrial Maintenance Mechanic Level Two)*
Trainee $20 ISBN 978-0-13-604625-7
Instructor $20 ISBN 978-0-13-604672-1

L3 POWER GENERATION MAINTENANCE MECHANIC

LEVEL 3

Curriculum Notes

- 155 Hours
- Published: 2010
- Please note that these modules are drawn as is from other craft areas. To order modules individually, refer to the specific craft page for ISBNs.
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-215409-3
Instructor's Guide: $97	978-0-13-215410-9

MODULES

Low-Pressure Steam Systems *(10 Hours)*
(Module ID 32208-07; from *Industrial Maintenance Mechanic Level Two)*
Trainee $20 ISBN 978-0-13-604628-8
Instructor $20 ISBN 978-0-13-604675-2

High-Pressure Steam Systems and Auxiliaries *(20 Hours)*
(Module ID 32209-07; from *Industrial Maintenance Mechanic Level Two)*
Trainee $20 ISBN 978-0-13-604664-6
Instructor $20 ISBN 978-0-13-604676-9

Heaters, Furnaces, Heat Exchangers, Cooling Towers and Fin Fans *(30 Hours)*
(Module ID 32211-07; from *Industrial Maintenance Mechanic Level Two)*
Trainee $20 ISBN 978-0-13-604666-0
Instructor $20 ISBN 978-0-13-604679-0

Hydrostatic and Pneumatic Testing *(10 Hours)*
(Module ID 32206-07; from *Industrial Maintenance Mechanic Level Two)*
Trainee $20 ISBN 978-0-13-604626-4
Instructor $20 ISBN 978-0-13-604673-8

Installing Fans and Blowers *(10 Hours)*
(Module ID 15312-08; from *Millwright Level Three)*
Trainee $20 ISBN 978-0-13-604771-1
Instructor $20 ISBN 978-0-13-604784-1

Conveyors *(5 Hours)*
(Module ID 15401-08; from *Millwright Level Four)*
Trainee $20 ISBN 978-0-13-610431-5
Instructor $20 ISBN 978-0-13-610479-7

Troubleshooting and Repairing Conveyors *(12.5 Hours)*
(Module ID 15402-08; from *Millwright Level Four)*
Trainee $20 ISBN 978-0-13-610432-2
Instructor $20 ISBN 978-0-13-610480-3

Basic Hydraulic Systems *(10 Hours)*
(Module ID 15409-08; from *Millwright Level Four)*
Trainee $20 ISBN 978-0-13-610475-9
Instructor $20 ISBN 978-0-13-610488-9

Troubleshooting and Repairing Hydraulic Equipment *(7.5 Hours)* (Module ID 15410-08; from *Millwright Level Four)*
Trainee $20 ISBN 978-0-13-610476-6
Instructor $20 ISBN 978-0-13-610489-6

Motor-Operated Valves *(15 Hours)*
(Module ID 40313-09; from *Industrial Maintenance E&I Technician Level Three)*
Trainee $20 ISBN 978-0-13-604743-8
Instructor $20 ISBN 978-0-13-604758-2

Advanced Blueprint Reading *(25 Hours)*
(Module ID 32402-09; from *Industrial Maintenance Mechanic Level Four)*
Trainee $20 ISBN 978-0-13-610446-9
Instructor $20 ISBN 978-0-13-610457-5

L4 POWER GENERATION MAINTENANCE MECHANIC

LEVEL 4

Curriculum Notes

- 165 Hours
- Published: 2010
- Please note that these modules are drawn as is from other craft areas. To order modules individually, refer to the specific craft page for ISBNs.
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-215411-6
Instructor's Guide: $97	978-0-13-215412-3

MODULES

Vibration and Balancing *(12.5 Hours)*
Trainee $20 ISBN 978-0-13-266220-8
Instructor $20 ISBN 978-0-13-266223-9
(Module ID 52401-10) Reviews machine basics and explains the causes of machine vibrations. Reviews the basics of vibration analysis and covers the devices used to detect and analyze vibration signatures. Explains how and why vibration analysis is used as part of predictive maintenance programs. Describes field machine balancing.

Preventive and Predictive Maintenance *(10 Hours)*
(Module ID 32401-09; from *Industrial Maintenance Mechanic Level Four)*
Trainee $20 ISBN 978-0-13-610445-2
Instructor $20 ISBN 978-0-13-610456-8

Fuel Preparation and Delivery Equipment *(25 Hours)*
Trainee $20 ISBN 978-0-13-266221-5
Instructor $20 ISBN 978-0-13-266224-6
(Module ID 52402-10) Explains the basic operations of a coal-fired boiler system. Describes the delivery processes from the storage yard into the coal preparation equipment, and from the equipment into the furnace. Addresses the maintenance checks that need to be made on coal delivery and preparation equipment and explains how solid fuel wastes are disposed of in coal-burning furnace systems. Describes how other solid-fuel furnaces, such as biomass furnaces, are used with boilers.

Introduction to Tube Work *(10 Hours)*
(Module ID 32212-07; from *Industrial Maintenance Mechanic Level Two)*
Trainee $20 ISBN 978-0-13-604667-7
Instructor $20 ISBN 978-0-13-604680-6

Compressors and Pneumatic Systems *(35 Hours)*
(Module ID 32403-09; from *Industrial Maintenance Mechanic Level Four)*
Trainee $20 ISBN 978-0-13-610447-6
Instructor $20 ISBN 978-0-13-610458-2

Troubleshooting and Repairing Pumps *(10 Hours)*
(Module ID 32407-09; from *Industrial Maintenance Mechanic Level Four)*
Trainee $20 ISBN 978-0-13-610452-0
Instructor $20 ISBN 978-0-13-610462-9

Troubleshooting and Repairing Gearboxes *(20 Hours)*
(Module ID 32408-09; from *Industrial Maintenance Mechanic Level Four)*
Trainee $20 ISBN 978-0-13-610453-7
Instructor $20 ISBN 978-0-13-610463-6

Setting Baseplates and Prealignment *(30 Hours)*
(Module ID 32305-08; from *Industrial Maintenance Mechanic Level Three)*
Trainee $20 ISBN 978-0-13-604685-1
Instructor $20 ISBN 978-0-13-604661-5

Turbines *(20 Hours)*
(Module ID 15505-09; from *Millwright Level Five)*
Trainee $20 ISBN 978-0-13-610496-4
Instructor $20 ISBN 978-0-13-610471-1

Maintaining and Repairing Turbine Components *(15 Hours)*
(Module ID 15506-09; from *Millwright Level Five)*
Trainee $20 ISBN 978-0-13-610497-1
Instructor $20 ISBN 978-0-13-610472-8

L1 POWER LINE WORKER

LEVEL 1

Curriculum Notes

- 402.5 Hours (Includes 100 hours of *Power Industry Fundamentals*, which is a prerequisite for Level 1 completion and must be purchased separately. See p. 83 for more information.)
- Published: 2011
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $67	978-0-13-257109-8
Instructor's Guide: $67	978-0-13-257115-9

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.

Power Line Worker Safety *(22.5 Hours)*

Trainee $20 ISBN 978-0-13-266327-4
Instructor $20 ISBN 978-0-13-266340-3
(Module ID 49102-11) Covers the safety equipment and safety practices associated with the special hazards of power line work, including electrical and arc flash hazards; traffic control; trenching; horizontal directional drilling; working in confined spaces; and safe entry into a substation.

Introduction to Electrical Circuits *(7.5 Hours)*

Trainee $20 ISBN 978-0-13-266328-1
Instructor $20 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)*

Trainee $20 ISBN 978-0-13-266329-8
Instructor $20 ISBN 978-0-13-266342-7
(Module ID 49104-11) Describes how to calculate voltage, current, and resistance values in series, parallel, and combination DC circuits using Ohm's law. Also includes a basic description of grounding and bonding.

Climbing Wooden Poles *(80 Hours)*

Trainee $20 ISBN 978-0-13-266330-4
Instructor $20 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)*

Trainee $20 ISBN 978-0-13-266331-1
Instructor $20 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.

To address the need for one standardized and nationally recognized Power Line Worker curriculum, NCCER has developed *Power Line Worker Level One*. Common to transmission, distribution, and substation, *Power Line Worker Level One* addresses the fundamental aspects of power line work to include safety, electrical theory, climbing techniques, aerial framing and rigging, and operating utility service equipment. After Level One, the training program diverges into the three specialty areas (transmission, distribution, and substation) for two additional years of skills training.

Tools of the Trade *(10 Hours)*

Trainee $20 ISBN 978-0-13-266332-8
Instructor $20 ISBN 978-0-13-266345-8
(Module ID 49107-11) Covers the specialized tools used by line workers, including hot sticks, as well as universal tool accessories. Also covers ladders and work platforms; crimpers; cable cutters; pneumatic tools; and powder-actuated tools.

Aerial Framing and Associated Hardware *(80 Hours)*

Trainee $20 ISBN 978-0-13-266333-5
Instructor $20 ISBN 978-0-13-266346-5
(Module ID 49108-11) Explains how to install guys to support a utility pole, as well as how to install the equipment on the pole to support conductors. Includes procedures for the installation of cross-arms, transformers, and conductors.

Utility Service Equipment *(15 Hours)*

Trainee $20 ISBN 978-0-13-266334-2
Instructor $20 ISBN 978-0-13-266348-9
(Module ID 49109-11) Provides descriptions and operations instructions for use of the digger derrick, bucket truck, crane truck, and aerial lift. Also covers safety requirements; inspection and maintenance; driving and setup operations; and emergency procedures.

Rigging *(12.5 Hours)*

Trainee $20 ISBN 978-0-13-266335-9
Instructor $20 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.

Setting and Pulling Poles *(20 Hours)*

Trainee $20 ISBN 978-0-13-266336-6
Instructor $20 ISBN 978-0-13-266350-2
(Module ID 49111-11) Provides instructions for the storage, loading, and transport of wooden utility poles. Includes use of the digger derrick to dig the hole and install the pole. Also covers pole removal using a hydraulic jacking device.

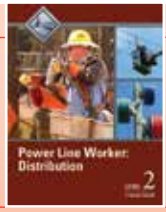
Trenching, Excavating, and Boring Equipment *(7.5 Hours)*

Trainee $20 ISBN 978-0-13-266337-3
Instructor $20 ISBN 978-0-13-266351-9
(Module ID 49112-11) Covers the use and maintenance of trenching equipment, backhoe/loaders, and horizontal directional drilling equipment for the installation of direct-buried power lines. Includes a review of safety guidelines related to buried utilities.

Introduction to Electrical Test Equipment *(7.5 Hours)*

Trainee $20 ISBN 978-0-13-266338-0
Instructor $20 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.

L2 POWER LINE WORKER: DISTRIBUTION



LEVEL 2

Curriculum Notes

- 157.5 Hours
- Published: 2011
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-273034-1
Instructor's Guide: $97	978-0-13-274327-3

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.

Alternating Current and Three-Phase Systems *(17.5 Hours)*

Trainee $20 ISBN 978-0-13-274259-7
Instructor $20 ISBN 978-0-13-274266-5
(Module ID 80201-11) Introduces the development of both single- and three-phase alternating current. Analyzes the relationship of AC phases and introduces key components used to refine AC power. Discusses the operation of transformers and introduces advanced AC concepts such as reactive power and the power factor.

Aerial Distribution Equipment *(25 Hours)*

Trainee $20 ISBN 978-0-13-274260-3
Instructor $20 ISBN 978-0-13-274268-9
(Module ID 80202-11) Identifies the various equipment components found on overhead distribution system poles and describes the function of each, including transformers, reclosers, fuses, sectionalizers, capacitor banks, and voltage regulators.

Cable and Conductor Installation and Removal *(20 Hours)*

Trainee $20 ISBN 978-0-13-274261-0
Instructor $20 ISBN 978-0-13-274269-6
(Module ID 80203-11) Describes the types of conductors and cables used in overhead and underground residential distribution systems and the equipment and procedures used to install and remove them. Includes methods used to splice conductors.

Underground Residential Distribution (URD) Systems *(30 Hours)*

Trainee $20 ISBN 978-0-13-274263-4
Instructor $20 ISBN 978-0-13-274271-9

(Module ID 80204-11) Describes the methods used to distribute power in residential and commercial subdivisions, including the equipment used in the process, such as pad-mount transformers and switchgear. Covers the components and methods used to connect primary and secondary power, as well as the protective devices used in URD systems and methods used to locate and repair buried cables.

Overhead and URD Service Installations *(15 Hours)*

Trainee $20 ISBN 978-0-13-274264-1
Instructor $20 ISBN 978-0-13-274272-6

(Module ID 80205-11) Describes the methods and procedures used in terminating single-phase and three-phase aerial and URD systems at residential and commercial customer locations. Includes coverage of revenue meters and street light connections.

Distribution Line Maintenance *(50 Hours)*

Trainee $20 ISBN 978-0-13-274265-8
Instructor $20 ISBN 978-0-13-274273-3

(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.

L3 POWER LINE WORKER: DISTRIBUTION

LEVEL 3

Curriculum Notes

- 145 Hours
- Published: 2012
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-294865-4
Instructor's Guide: $97	978-0-13-294924-8

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.

Introduction to Substations *(10 Hours)*

(Module ID 82201-12; from *Power Line Worker: Substation Level Two*)

Trainee $20 ISBN 978-0-13-296779-2
Instructor $20 ISBN 978-0-13-296785-3

Live-Line Work *(40 Hours)*

Trainee $20 ISBN 978-0-13-296759-4
Instructor $20 ISBN 978-0-13-296764-8

(Module ID 80301-12) Covers tools such as hot sticks, shotgun sticks, and wire tongs, along with the PPE and safe work practices that are critical elements of live line and bare hand work. Includes coverage of various live-line tasks such as different methods of moving conductors and replacing insulators, cross-arms, and poles.

Three-Phase URD Systems *(25 Hours)*

Trainee $20 ISBN 978-0-13-296760-0
Instructor $20 ISBN 978-0-13-296766-2

(Module ID 80302-12) Covers safety practices associated with three-phase URD systems; describes vault and manhole applications; and explains different transformer configurations and sectionalizing 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)*

Trainee $20 ISBN 978-0-13-296761-7
Instructor $20 ISBN 978-0-13-296767-9

(Module ID 80303-12) Presents an overview of monitoring and protection systems and reviews the key components that make them work. Describes feeder diagrams and their use in locating and identifying components.

Troubleshooting *(40 Hours)*

Trainee $20 ISBN 978-0-13-296762-4
Instructor $20 ISBN 978-0-13-296768-6

(Module ID 80304-12) Focuses on the methods used to safely locate and correct faults in aerial and URD systems. Includes troubleshooting methods as well as work site preparation.

Introduction to Smart Grids *(2.5 Hours)*

Trainee $20 ISBN 978-0-13-296763-1
Instructor $20 ISBN 978-0-13-296769-3

(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; see p. 69)

Trainee $43 ISBN 978-0-13-292245-6
Instructor $43 ISBN 978-0-13-292255-5

L2 POWER LINE WORKER: SUBSTATION

LEVEL 2

Curriculum Notes

- 180 Hours
- Published: 2012
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-295343-6
Instructor's Guide: $97	978-0-13-296745-7

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 Substations *(10 Hours)*

Trainee $20 ISBN 978-0-13-296779-2
Instructor $20 ISBN 978-0-13-296785-3

(Module ID 82201-12) Provides an overview of the different types and functions of substations. Identifies the various voltage classes and introduces the primary equipment and components found in substations. Safe work practices and access issues related to substations are presented, as well as an introduction to one-line diagrams.

Managing Electrical Hazards *(12.5 Hours)*

(Module ID 26501-12; from *Electrical)*

Trainee $22 ISBN 978-0-13-294869-2
Instructor $22 ISBN 978-0-13-294917-0

Alternating Current and Three-Phase Systems *(17.5 Hours)*

(Module ID 80201-12; from *Power Line Worker: Distribution Level Two)*

Trainee $20 ISBN 978-0-13-274259-7
Instructor $20 ISBN 978-0-13-274266-5

Conductors and Cables *(10 Hours)*

Trainee $20 ISBN 978-0-13-296780-8
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.

Cable Tray *(7.5 Hours)*

(Module ID 26207-11; from *Electrical Level Two)*

Trainee $20 ISBN 978-0-13-266136-2
Instructor $20 ISBN 978-0-13-266147-8

Conduit Bending *(15 Hours)*

(Module ID 26204-11; from *Electrical Level Two)*

Trainee $20 ISBN 978-0-13-266133-1
Instructor $20 ISBN 978-0-13-266144-7

Conductor Installations *(10 Hours)*

(Module ID 26206-11; *from Electrical Level Two)*

Trainee $20 ISBN 978-0-13-266135-5
Instructor $20 ISBN 978-0-13-266146-1

Conductor Terminations and Splicing *(7.5 Hours)*

(Module ID 26208-11; from *Electrical Level Two)*

Trainee $20 ISBN 978-0-13-266137-9
Instructor $20 ISBN 978-0-13-266149-2

Grounding Systems *(12.5 Hours)*

Trainee $20 ISBN 978-0-13-296782-2
Instructor $20 ISBN 978-0-13-296787-7

(Module ID 82203-12) Describes the purpose and arrangement of grounding systems installed beneath a substation. Covers the materials of construction and the approaches to reliable ground system connections. Introduces safety concerns and precautions associated with substation and grounding grid expansion.

Grades *(15 Hours)*

(Module ID 22106-12; from *Heavy Equipment Operations Level One*)

Trainee $20 ISBN 978-0-13-292311-8
Instructor $20 ISBN 978-0-13-292319-4

Concrete Work *(35 Hours)*

Trainee $20 ISBN 978-0-13-296783-9
Instructor $20 ISBN 978-0-13-296788-4

(Module ID 82204-12) Provides comprehensive coverage of concrete pouring and finishing techniques. Includes detailed information on concrete types and their uses. Form layout and construction, along with basic surveying skills, is presented. Also provides detailed coverage of rebar types and their common geometric forms.

Mechanical Construction Methods and Materials *(17.5 Hours)*

Trainee $20 ISBN 978-0-13-296784-6
Instructor $20 ISBN 978-0-13-296789-1

(Module ID 82205-12) Covers the diverse types of substation structures and their composition. Identifies components commonly supported by structures and the various bus forms and materials of construction. Includes thorough coverage of threaded fasteners along with mechanical torquing tools and procedures.

Intermediate Rigging *(10 Hours)*

(Module ID 38201-11; from *Intermediate Rigger)*

Trainee $20 ISBN 978-0-13-266181-2
Instructor $20 ISBN 978-0-13-266185-0

L3 POWER LINE WORKER: SUBSTATION

LEVEL 3

Curriculum Notes

- 167.5 Hours
- Published: 2012
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-294866-1
Instructor's Guide: $97	978-0-13-294922-4

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.

Temporary Grounding *(15 Hours)*

(Module ID 40308-09; from *Industrial Maintenance E&I Level Three)*

Trainee $20 ISBN 978-0-13-604738-4
Instructor $20 ISBN 978-0-13-604753-7

Advanced Drawing Reading *(20 Hours)*

Trainee $20 ISBN 978-0-13-296791-4
Instructor $20 ISBN 978-0-13-296797-6

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

Medium- and High-Voltage Equipment Installation *(25 Hours)*

Trainee $20 ISBN 978-0-13-296792-1
Instructor $20 ISBN 978-0-13-296798-3

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

Control House *(20 Hours)*

Trainee $20 ISBN 978-0-13-296793-8
Instructor $20 ISBN 978-0-13-296800-3

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

Connectors, Conductor Terminations, and Splicing *(25 Hours)*

Trainee $20 ISBN 978-0-13-296794-5
Instructor $20 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)*

Trainee $20 ISBN 978-0-13-296795-2
Instructor $20 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)*

Trainee $20 ISBN 978-0-13-296796-9
Instructor $20 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.

Fundamentals of Crew Leadership *(20 Hours)*

(Module ID 46101-11; see p. 69)

Trainee $43 ISBN 978-0-13-292245-6
Instructor $43 ISBN 978-0-13-292255-5

L2 POWER LINE WORKER: TRANSMISSION

LEVEL 2

Curriculum Notes

- 175 Hours
- Published: 2011
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-273033-4
Instructor's Guide: $97	978-0-13-274330-3

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.

Alternating Current and Three-Phase Systems *(17.5 Hours)*

(Module ID 80201-11; from *Power Line Worker: Distribution Level Two*)

Trainee $20 ISBN 978-0-13-274259-7
Instructor $20 ISBN 978-0-13-274266-5

Transmission Structure Rigging *(17.5 Hours)*

Trainee $20 ISBN 978-0-13-296770-9
Instructor $20 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 $20 ISBN 978-0-13-274276-4
Instructor $20 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, guying and anchoring, and grounding and bonding.

Transmission Equipment Installation *(50 Hours)*

Trainee $20 ISBN 978-0-13-274277-1
Instructor $20 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, clipping in, and the installation of accessories such as vibration dampers, spacers, warning lights, and day markers.

Transmission System Maintenance *(40 Hours)*

Trainee $20 **ISBN 978-0-13-274278-8**
Instructor $20 **ISBN 978-0-13-274282-5**

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

L3 POWER LINE WORKER: TRANSMISSION

LEVEL 3

Curriculum Notes

- 220 Hours
- Published: 2012
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.

PAPERBACK	ISBN
Trainee Guide: $97	978-0-13-294867-8
Instructor's Guide: $97	978-0-13-294920-0

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 **ISBN 978-0-13-296772-3**
Instructor $20 **ISBN 978-0-13-296776-1**

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

Reconductoring Transmission Lines *(40 Hours)*

Trainee $20 **ISBN 978-0-13-296775-4**
Instructor $20 **ISBN 978-0-13-296778-5**

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

Construction, Maintenance, and Repair – Hot Stick *(80 Hours)*

Trainee $20 **ISBN 978-0-13-296774-7**
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*)

Trainee $20 **ISBN 978-0-13-266190-4**
Instructor $20 **ISBN 978-0-13-266193-5**

Field Safety

FIELD SAFETY

Curriculum Notes

- 45 Hours
- Revised: 2013, Second Edition
- Provides the necessary safety task training to all field personnel. This manual is designed for individuals involved with completing or overseeing a specific task, from the craftsperson, crew leader, and safety supervisor to superintendent.
- New printed instructor's package includes lesson plans, instructor's copy of trainee guide with an access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.
- A Spanish translation of the first edition is available. Please see NCCER's online catalog for more information.

PAPERBACK	ISBN
Participant Guide: $97	978-0-13-340245-2
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MODULES

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

Safety Learning Series

The Safety Learning Series consists of three separate titles comprising a suggested education path: the *Basic Safety* module from *Core Curriculum, Field Safety,* and *Safety Technology.* The curriculum was built on industry best practices by a team of safety professionals and meets the training needs of the craft professional, safety technician, and safety manager.

The modularized structure of the curriculum enables companies to cost-effectively customize training programs and offer industry credentials through the NCCER Registry System. The Safety Learning Series has been recognized by the Council on Certification of Health, Environmental, and Safety Technologists (CCHEST). Completion of the Safety Learning Series will help personnel prepare for the Safety Trained Supervisor (STS) and Construction Health and Safety Technologist (CHST) certification exams administered by CCHEST. CCHEST is a joint venture of the Board of Certified Safety Professionals and the American Board of Industrial Hygiene.

Introduction to Safety *(10 hours)*

Trainee $20 **ISBN 978-0-13-340359-6**
Instructor $20 **ISBN 978-0-13-340368-8**

(Module ID 75101-13) Presents basic safety concepts and explains the difference between regulatory compliance and best practices. Introduces OSHA and explains how accidents affect everyone on a job site. Provides an overview of common jobsite hazards, including walking and working surfaces, temperature extremes, fire prevention, and tool safety. Identifies the elements of a hazard communication system and describes the types of information found on a product's safety data sheet (SDS).

Confined Spaces and Excavations *(5 hours)*

Trainee $20 **ISBN 978-0-13-340360-2**
Instructor $20 **ISBN 978-0-13-340369-5**

(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 **ISBN 978-0-13-340361-9**
Instructor $20 **ISBN 978-0-13-340370-1**

(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 **ISBN 978-0-13-340362-6**
Instructor $20 **ISBN 978-0-13-340371-8**

(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 **ISBN 978-0-13-340363-3**
Instructor $20 **ISBN 978-0-13-340372-5**

(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.

Steel Erection *(2.5 hours)*

Trainee $20 ISBN 978-0-13-340364-0
Instructor $20 ISBN 978-0-13-340374-9
(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.

Heavy Equipment, Forklift, and Crane Safety *(5 hours)*

Trainee $20 ISBN 978-0-13-340366-4
Instructor $20 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.

Concrete and Masonry *(2.5 hours)*

Trainee $20 ISBN 978-0-13-340367-1
Instructor $20 ISBN 978-0-13-378123-6
(Module ID 75119-13) Describes the personal protective equipment that must be used when working with concrete and masonry as well as the common jobsite and health hazards associated with this type of work.

Introduction to Materials Handling *(5 hours)*

Trainee $20 ISBN 978-0-13-377943-1
Instructor $20 ISBN 978-0-13-377944-8
(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

PAPERBACK **ISBN**
Trainee $20 978-0-13-407556-3
Instructor $20 978-0-13-412939-6

This module, from *Core Curriculum*, replaces the *Safety Orientation* book. See p. 11 for more information.

Managing Electrical Hazards

12.5 Hours
Updated: 2015, Third Edition
Module ID 26501-15

PAPERBACK **ISBN**
Trainee Guide: $25 978-0-13-416312-3
Instructor's Guide: $25 978-0-13-413115-3
See p. 22 for more information.

Safety Technology

SAFETY TECHNOLOGY

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Curriculum Notes

- 45 Hours
- To Be Revised: 2017, Third Edition
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PAPERBACK **ISBN**
Participant Guide: $85 978-0-13-444636-3
Instructor's Package: $85 978-0-13-454301-7

MODULES

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

Introduction to Safety Technology *(2.5 Hours)*

Trainee $20 ISBN 978-0-13-451725-4
Instructor $20 ISBN 978-0-13-451723-0
(Module ID 75201-17) Describes the responsibilities of a safety technician and identifies the basic components in a safety program. Provides an overview of regulatory requirements.

Developing a Safety Culture *(2.5 Hours)*

Trainee $20 ISBN 978-0-13-453892-1
Instructor $20 ISBN 978-0-13-451726-1
(Module ID 75205-17) Explains how to develop an effective safety culture on the jobsite, including communication techniques, motivation, and how to respond to behavioral issues.

Hazard Recognition, Environmental Awareness, and Occupational Health *(5 Hours)*

Trainee $20 ISBN 978-0-13-453896-9
Instructor $20 ISBN 978-0-13-453893-8
(Module ID 75219-17) Covers environmental and safety hazards. Explains how to evaluate risks and identify appropriate methods of hazard control. Also discusses environmental regulations for hazardous materials and describes the elements in a medical monitoring program.

Safety Analysis and Assessment *(5 Hours)*

Trainee $20 ISBN 978-0-13-453897-6
Instructor $20 ISBN 978-0-13-453894-5
(Module ID 75220-17) Provides guidance on safety performance analysis and employee coaching. Also explains how to complete job and task safety planning.

Safety Data Tracking and Trending *(5 Hours)*

Trainee $20 ISBN 978-0-13-451727-8
Instructor $20 ISBN 978-0-13-453898-3
(Module ID 75221-17) Describes how to conduct safety inspections, audits, and employee safety observations. Covers both traditional and proactive methods of performance measurement, and explains how to analyze safety data in order to prevent future incidents.

Site-Specific Safety Plans *(5 Hours)*

Trainee $20 ISBN 978-0-13-453900-3
Instructor $20 ISBN 978-0-13-453899-0
(Module ID 75222-17) Explains how to use pre-bid checklists to identify hazards and develop a site safety plan. Also describes how to develop an emergency action plan.

Safety Orientation and Safety Meetings *(5 Hours)*

Trainee $20 ISBN 978-0-13-451729-2
Instructor $20 ISBN 978-0-13-451728-5
(Module ID 75223-17) Describes how to prepare and deliver effective training using both formal safety meetings and tailgate talks.

Permits and Policies *(5 Hours)*

Trainee $20 ISBN 978-0-13-451735-3
Instructor $20 ISBN 978-0-13-451730-8
(Module ID 75224-17) Provides an overview of the various work permits required on a construction site. Also provides detailed procedures for completing a hot work permit, lockout/tagout, and confined-space entry permit.

Incident Investigations, Policies, and Analysis *(5 Hours)*

Trainee $20 ISBN 978-0-13-451734-6
Instructor $20 ISBN 978-0-13-451731-5
(Module ID 75225-17) Describes how to conduct an incident investigation, including employee interviews and reporting requirements. Also explains how to analyze an incident to determine the root cause and prevent future incidents.

OSHA Inspections and Recordkeeping *(5 Hours)*

Trainee $20 ISBN 978-0-13-451733-9
Instructor $20 ISBN 978-0-13-451736-0
(Module 75226-17) Discusses the OSHA requirements for recordkeeping, and explains how to manage the safety and health records for a jobsite. Covers the two main types of OSHA inspections.

Ordering information for *Safety Technology*, Second Edition:

PAPERBACK *(includes all five volumes)* **ISBN**
Participant Guide: $85 978-0-13-106258-0
Instructor's Guide: $85 978-0-13-106259-7

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