The Standard for Developing Craft Professionals

2016 NCCER CURRICULUM CATALOG

DEVELOPED BY THE INDUSTRY... FOR THE INDUSTRY.
Standardized, competency-based curricula for construction professionals.
NCCER develops and publishes world-class curricula in partnership with Pearson, the world’s leading publisher of academic and reference textbooks. Please contact your Pearson representative for all of your curriculum needs.

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Call our Ordering Department at: 800-922-0579
Go online using OASIS at: http://oasis.pearson.com
Fax your order toll-free to: 800-445-6991
Mail your purchase order to:
Pearson Higher Education Order Department
PO Box 3039
Lebanon, IN 46052

High School/Secondary Institution Ordering Information

Call our Ordering Department at: 800-848-9500
Fax your order toll-free to: 877-260-2530
Mail your purchase order to:
Pearson Curriculum Division
PO Box 2500
Lebanon, IN 46052-3009

Please note: Remember to clearly mark “CONFIRMATION” on any paper copy of a phone or faxed-in order.
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Letter from the Chairman of the Board

This year, NCCER celebrates 20 years of service to the construction industry. Over the last two decades, NCCER has become the standard for developing craft professionals. Founded in the early 90s when 11 contractors came together with the Construction Education Foundation of Associated Builders and Contractors to standardize curricula, NCCER curricula have evolved and adapted beyond all expectations to meet the ever-changing workforce development needs of the construction industry.

NCCER was created to address the shortage of skilled craft professionals and originally developed training curricula for five craft areas. Today, NCCER produces curricula and assessments for more than 70 craft areas and reaches over one million people annually. In its founding year, NCCER recorded 162,000 module completions. To date, the NCCER Registry has recorded over 13 million module completions, with craft professionals completing over 1 million modules each year since 2009.

In the late 90s, NCCER expanded its scope by creating the National Craft Assessment and Certification Program. Today, it has become the industry-leading program for evaluating skills competence and certifying incumbent craft professionals. Through this system of training and assessment, NCCER is able to issue industry-recognized, portable credentials and certifications that validate the knowledge and skills of craft professionals. Having a workforce of trained and credentialed craft professionals helps our industry deliver projects safely, on time and on budget.

NCCER’s commitment to continuous curricula development and revision ensures that craft professionals are trained to the most current industry standards. This year’s catalog includes revisions to many of NCCER’s bestselling curricula, such as Welding, Construction Technology, Carpentry and Mechanical Insulating. In response to industry demand, NCCER has also updated its Heavy Highway Construction curriculum. The revised curriculum now includes a second level with three career paths: grading, paving and structures.

This year, we celebrate the evolution and success of NCCER while remaining aware of the workforce challenges that led to the formation of NCCER are even more glaring as we look to the future of construction. NCCER is committed to continuous improvement and is particularly driven to improve on leveraging technology across its system. As always, NCCER remains responsive to the needs of its stakeholders and constituents.

NCCER’s achievements have been nothing short of extraordinary, and its resources continue to be devoted to its paramount mission: the development of our industry’s craft workforce. I am proud to be a longstanding member of NCCER’s board of trustees, and I look forward to serving as chairman this year. Thank you for your continued support in building a safe, productive and sustainable workforce of craft professionals.

G. Edward Cassady, III
Sr. Vice President and CFO at Robins & Morton
2016 Chairman of the NCCER Board of Trustees
NEW for 2016

2016 will once again be an exceptional year for new and revised products! Examples include new titles in Heavy Highway Construction, Mechanical Insulating, Welding, Instrumentation and more. We have revised and enhanced our instructor resources and will continue to offer new online courses for NCCERconnect throughout 2016.

Basic Safety (Construction Site Safety Orientation)  
*p. 11*

Cabinetmaking  
p. 16

Construction Technology  
p. 18

Heavy Highway Construction, Levels 1 & 2  
p. 26

Instrumentation, Levels 2–4  
p. 36-37

Mechanical Insulating, Level 1  
p. 41

Welding, Level 3  
p. 62
Thank You

NCCER would like to thank the Subject Matter Experts (SMEs) from the following companies who provided their expertise and assistance in revising the curricula releasing in 2016.

ABC New Orleans/Bayou Chapter
ABC Pelican Chapter
ABC Green Committee
ABC Merit Shop Training Program Inc. dba Miken Specialties Ltd.
ABC National
ABC Northern California Chapter
Alfred State College
Baton Rouge Community College
Blythe Development Co.
Bollinger Shipyards
Brace Industrial Group
Brand Energy Solutions LLC
Brazosport College
Brock Services LLC
Bridgerland Applied Technology College
Carolinian AGC
Carolina Bridge Co.
Central Louisiana Community Technical College
Cianbro Corporation
Charah
Claddagh Enterprises
Construction Education Foundation
Crowder Construction Co.
Faith Technologies Inc.
Flint Co. LLC
First Coast Technical College
Flint Energy Services
Greater Baton Rouge Industrial Managers Association
Greenville Technical College
Huntington-Ingalls
Industrial Construction & Engineering Co.
Industrial Management & Training Institute
Insulation Specialties Inc.
ISC Constructors LLC
Jacobs
JEM Electrical Consulting
JV Industrial Companies Ltd.
KBR Industrial Services
L&C Insulation
Lee College
Lincoln Electric
Madison Comprehensive High School
Maintenance & Construction Technology Alliance
MMR Group Inc.
National Field Services
National Insulation Association
Northeast Community College
Northern Industrial Training
Northland Pioneer College
Petrin Corporation
Safety Council of Texas City
Scaffold Resource
Signal International
Southern Tier Insulations
SpawGlass Holding LP
Spec-Weld Technologies
Starcon
Tecnico Corporation
Testronics
The Brock Group
The Haskell Co.
TIC — The Industrial Company
Toledo Refining Co. LLC
Total Petrochemicals and Refining USA Inc.
Tri-City Electrical Contractors Inc.
Turner Industries
TurnKey I&E Ltd.
University of Florida, M.E. Rinker, Sr. School of Construction Management
West-Mec
W. G. Tomko Inc.
The NCCER Program

INDUSTRY STANDARD
NCCER sets the standard for developing craft professionals. NCCER is a not-for-profit education foundation created in 1996 as The National Center for Construction Education and Research. It was developed with the support of more than 125 construction CEOs and various association and academic leaders who united to revolutionize training for the construction industry. NCCER has developed a consistent program of accreditation, instructor certification, standardized curriculum, registry, assessment and certification, which is a key element in developing a skilled workforce of craft professionals.

PROGRAM ACCREDITATION
NCCER is the accrediting body for the industry and establishes the benchmark for quality training and assessments. By partnering with industry and academia, NCCER has developed a system for program accreditation that is similar to those found in institutions of higher learning. This process ensures that students receive quality training based on uniform standards and criteria.

INSTRUCTOR CERTIFICATION
The Instructor Certification Training Program is an integral part of NCCER’s accreditation process. This program ensures uniform and 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 trained and certified to teach NCCER curricula. This network of certified instructors ensures that NCCER training programs meet the standards of instruction set by the industry. There are more than 6,000 Master Trainers and over 63,000 craft instructors within the NCCER instructor network.

STANDARDIZED CURRICULA
In cooperation with publishing partner Pearson, NCCER develops and publishes world-class curricula created by Subject Matter Experts representing contractors and schools from around the country. Subject Matter Experts ensure that training programs meet or exceed industry standards. NCCER curricula, which include more than 70 craft areas, are taught worldwide by contractors, associations, construction users and secondary and postsecondary schools. In addition, multiple state departments of education recognize the curricula. Unique features of NCCER curricula include competency-based modules with measurable objectives; a modular format for flexibility and custom task training; compliance with the Department of Labor Office of Apprenticeship requirements for time-based training; and portable, industry-recognized credentials. 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. NCCER curricula can be easily adapted to cost-effectively meet the needs of your program.

INDUSTRY-RECOGNIZED CREDENTIALS
NCCER maintains a portable and widely recognized credentialing and certification system through its registry. The NCCER Registry System ensures portability of skills by providing transcripts, certificates and wallet cards to students who successfully complete NCCER curricula through an Accredited Training Sponsor. These valuable industry credentials benefit students as they seek employment and build their careers. Over 12 million module completions have been delivered to students and craft professionals internationally.

OUTREACH
Build Your Future is NCCER’s national recruitment and image enhancement initiative to recruit the next generation of craft professionals. Build Your Future guides America’s youth, displaced workers and military veterans to opportunities for advanced education and training that lead to long-term, rewarding careers in construction. Visit BYF.org for interactive resources, including career descriptions, salaries, career paths and projected demand for craft professionals. In addition, download the latest industry workforce recruitment resources, including best practices, Careers in Construction Month planning material and construction career information for parents, students, educators and military veterans.
Assessments and Certification

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 Prove™, 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 Craft
- 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*
- 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*

Pipeline
Gas
- Gas Maintenance Technician
- Gas Pipeline Operations
- Abnormal Operating Conditions-Control Center
- Abnormal Operating Conditions-Field

Liquid
- Field Operator
- Control Center Operations Technician
- Mechanical Pipeline Technician
- Abnormal Operating Conditions-Control Center
- Abnormal Operating Conditions-Field

Liquid & Gas
- Electrical and Instrumentation Pipeline Technician
- Corrosion Prevention Field Technician 1:
  - Installation
  - Measurement
  - Control Center Operations Technician
- Mechanical Pipeline Technician
- Abnormal Operating Conditions-Control Center
- Abnormal Operating Conditions-Field

Corrosion Prevention Field Technician 2
Corrosion Prevention Field Technician 3
Custom Pipeline Maintenance Technician
Custom Pipeline Maintenance Technician:
  - Level 1
  - Level 2

Custom Pipeline Maintenance Inspector
NDT: Radiographic Film Interpretation of Pipeline Welds
Pipeline Maintenance Technician

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 ncerc.org/crane

Mobile Crane Operator
13 equipment specific certifications (including capacity)

Tower Crane Operator
Three equipment specific certifications

Rigger
Three-level certification program

Signal Person
Certification program
Interested in creating a custom book?

**Program Features Include:**
- Flexibility
- Customized Covers
- Quality
- Free Evaluation Copy
- Quick Turnaround

1. **Select a craft**
   Choose from over 125 titles.

2. **Sequence the modules in any order**
   Choose the modules you want, mix and match crafts and arrange them in the order you desire.

3. **Customize your cover**
   Select a cover and add your customized information.

4. **Select print, digital or both**
   Choose your delivery format and place your order.

For more information or to get started, visit:
www.nccer.org/pearson-custom
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.

Contact your Pearson representative for details or visit [www.nccerconnect.com](http://www.nccerconnect.com).
Instructor Resources and Online Bookstore

Instructor Resources

Enhanced Resources

New 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 Sheets from www.nccerirc.com. To order instructor resources, contact your Pearson NCCER Executive Director.

Available Online

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

NCCER Online Bookstore

Visit the online bookstore to browse our catalog, access help and support, find how-to videos and much more.

www.nccer.org/bookstore

For the most up-to-date information on print and digital solutions, select the “updates” tab on the top navigation bar.
### 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.

**Complimentary Supplements**

The following product supplements are available at no cost in the Curriculum section at www.nccer.org:

- **Competencies/Objectives Lists** — Include all competencies and comprehensive learning objectives for each craft.
- **Performance Task Checklists** — Correlate 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** — Include all of the equipment and materials required to teach each module.
- **Revision Maps** — Track revised modules, record new module numbers and show how modules may have been incorporated into revisions or indicate if they have been deleted.

### Module ID Numbers

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

```
29102-15
```

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.

<table>
<thead>
<tr>
<th>Craft Identifier</th>
<th>Module ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative Energy</td>
<td>08</td>
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<tr>
<td>Boilermaking</td>
<td>34</td>
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<tr>
<td>Carpentry</td>
<td>27</td>
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<tr>
<td>Concrete Finishing</td>
<td>23</td>
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<tr>
<td>Construction Craft Laborer</td>
<td>35</td>
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<tr>
<td>Construction Technology</td>
<td>68</td>
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<tr>
<td>Control Center Abnormal Operating Conditions</td>
<td>71</td>
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<tr>
<td>Core Curriculum</td>
<td>00</td>
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<tr>
<td>Drywall</td>
<td>45</td>
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<td>Electrical</td>
<td>26</td>
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<tr>
<td>Electronic Systems Technician</td>
<td>33</td>
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<tr>
<td>Field Abnormal Operating Conditions</td>
<td>71</td>
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<tr>
<td>Fundamentals of Crew Leadership</td>
<td>46</td>
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<tr>
<td>Green/Sustainable Construction</td>
<td>70</td>
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<td>Heavy Equipment Operations</td>
<td>22</td>
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<td>Heavy Highway Construction</td>
<td>36</td>
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<td>HVAC</td>
<td>03</td>
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<tr>
<td>Hydroblasting</td>
<td>43</td>
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<tr>
<td>Industrial Coatings</td>
<td>69</td>
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<tr>
<td>Industrial Maintenance Mechanic</td>
<td>32</td>
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<tr>
<td>Industrial Maintenance E &amp; I</td>
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<tr>
<td>Instrumentation</td>
<td>12</td>
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<tr>
<td>Ironworking</td>
<td>30</td>
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<tr>
<td>Maritime Industry Fundamentals</td>
<td>84</td>
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<tr>
<td>Maritime Pipefitting</td>
<td>85</td>
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<tr>
<td>Maritime Structural Fitter</td>
<td>86</td>
</tr>
<tr>
<td>Masonry</td>
<td>28</td>
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<tr>
<td>Mechanical Insulating</td>
<td>19</td>
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<td>Millwright</td>
<td>15</td>
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<tr>
<td>Mobile Crane Operations</td>
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</tr>
<tr>
<td>Painting (Commercial/Residential)</td>
<td>07</td>
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<tr>
<td>Pipefitting</td>
<td>08</td>
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<td>Pipelayder</td>
<td>24</td>
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<tr>
<td>Pipeline Abnormal Operating Conditions</td>
<td>71</td>
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<td>Pipeline Control Center Operations</td>
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<td>Pipeline Core</td>
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<td>Pipeline Corrosion Control</td>
<td>61</td>
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<td>Pipeline Electrical &amp; Instrumentation</td>
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<td>Pipeline Field Operations, Gas</td>
<td>67</td>
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<td>Pipeline Field Operations, Liquid</td>
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<td>Pipeline Maintenance</td>
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<td>Pipeline Mechanical</td>
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<td>Power Industry Fundamentals</td>
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<td>Power Generation Maintenance Electrician</td>
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<td>Power Generation I&amp;C Maintenance Technician</td>
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<td>Power Line Worker: Transmission</td>
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<td>Plumbing</td>
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<td>Project Management</td>
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<td>Project Supervision</td>
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<td>Reinforcing Ironwork</td>
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<td>Safety</td>
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<td>Scaffolding</td>
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<td>Sheet Metal</td>
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<td>Signal Person</td>
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<td>Site Layout</td>
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<td>Solar Photovoltaic Installation</td>
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<td>Sprinkler Fitting</td>
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<td>Tower Crane</td>
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<td>Weatherization</td>
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<td>Welding</td>
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<tr>
<td>Wind Turbine Maintenance Technician</td>
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</tbody>
</table>
Core Curriculum: Introductory Craft Skills

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
Instructor $20

(Module ID 00101-15) Presents basic job site 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
Instructor $20

(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
Instructor $20

(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
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
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
Instructor $20

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

Basic Communication Skills (7.5 Hours)

Trainee $20
Instructor $20

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

Basic Employability Skills (7.5 Hours)

Trainee $20
Instructor $20

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

Introduction to Material Handling (5 Hours)

Trainee $20
Instructor $20

(Module ID 00109-15) Describes the hazards associated with handling materials and provides techniques to avoid both injury and property damage. Also introduces common material-handling equipment.

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

A Novel Approach

PAPERBACK
Published: 2006

Instructor’s Edition: $30

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

PAPERBACK

Trainee $20
Instructor $20

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

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, PowerPoint®, and performance profile sheets from www.nccerirc.com.

See p. 65 for more information

Boilermaking Tools (15 Hours)
Trainee $20
Instructor $20
(Module ID 34101-10) Provides an overview of the boilermaker craft, including a description of career opportunities.

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

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

Cutting and Fitting Gaskets (12.5 Hours)
Trainee $20
Instructor $20
(Module ID 34106-10) Describes gasket materials used in mating flanges and procedures for laying out and cutting a flange gasket.

Base Metal Preparation (10 Hours)
Trainee $20
Instructor $20
(Module ID 34107-10) Describes welding and cutting processes and related equipment. Includes filler metals, joint design, and the codes that govern welding practices.

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

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
Instructor $20
(Module ID 34101-10) Provides an overview of the boilermaker craft, including a description of career opportunities.

Boilermaking Safety (12.5 Hours)
Trainee $20
Instructor $20
(Module ID 34102-10) Covers safety issues specific to boilermakers on the job.

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

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

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, PowerPoint®, and performance profile sheets from www.nccerirc.com.

L1 BOILERMAKING

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, PowerPoint®, and performance profile sheets from www.nccerirc.com.

PAPERBACK ISBN
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
Instructor $20
(Module ID 34101-10) Provides an overview of the boilermaker craft, including a description of career opportunities.

Boilermaking Safety (12.5 Hours)
Trainee $20
Instructor $20
(Module ID 34102-10) Covers safety issues specific to boilermakers on the job.

Curriculum Notes
• 185 Hours
• Revised: 2011, Second Edition
• 185 Hours
• Instructor’s Guide includes access code to download TestGen software, module exams, PowerPoint®, and performance profile sheets from www.nccerirc.com.

PAPERBACK ISBN
Trainee Guide: $97 978-0-13-213705-8

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.

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

Identifying and Installing Valves (20 Hours)
Trainee $20
Instructor $20
(Module ID 34202-11) Identifies valves found in boiler systems. Describes valve components and explains their functions. Explains how to select, store, handle, and install valves, and describes valve markings and nameplate information.
Pipe Hangers and Supports (25 Hours)
Trainee $20
Instructor $20
(Module ID 34203-11) Identifies pipe hangers and supports and explains how to interpret pipe support drawings and symbols. Explains how to select, store, handle, install, and maintain spring supports.

Drawings and Detail Sheets (15 Hours)
Trainee $20
Instructor $20
ISBN 978-0-13-257800-4
(Module ID 34204-11) Explains how to read drawings and their symbols. Covers plot plans, structural drawings, elevation drawings, ex-built drawings, equipment arrangement drawings, piping and instrumentation drawings, isometric drawings, spool sheets, detail sheets, and orthographic drawings.

Fasteners and Anchors (5 Hours)
Trainee $20
Instructor $20
(Module ID 34205-11) Covers threaded and non-threaded fasteners and anchoring devices. Explains how to select fasteners and anchors for given applications. Describes how to install threaded, non-threaded, and insulated fasteners and anchors.

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

Socket Weld Pipe Fabrication (25 Hours)
Trainee $20
Instructor $20
(Module ID 34207-11) Describes different types of socket weld piping materials and fittings and how to read socket weld piping drawings. Explains how to determine pipe lengths between socket weld fittings, as well as how to mate socket weld fittings to pipe.

Butt Weld Pipe Fabrication (40 Hours)
Trainee $20
Instructor $20
(Module ID 34208-11) Covers preparing pipe ends for butt welding; determining pipe lengths between butt weld fittings; and using welding jigs to align pipe and butt weld fittings for welding. Explains how to select and install backing rings.

Tube Weld Preparation and Fitting (15 Hours)
Trainee $20
Instructor $20
(Module ID 34209-11) Describes methods used to gain access to boiler tubes needing repair, and to prepare boiler tubes for replacement. Explains how to 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
(Module ID 34210-11) Describes air carbon arc cutting (CACA) equipment and processes. Explains how to select and install CACA electrodes, and how to prepare the work area and CACA equipment for safe operation. Provides instructions for using CACA equipment for washing and gouging activities.

Boiler Pressure Components (25 Hours)
Trainee $20
Instructor $20
(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
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
Instructor $20
(Module ID 34305-11) Describes types of BRIL and explains their functions. Also addresses hazards associated with BRIL.

Advanced Boilermaking Construction Drawings (20 Hours)
Trainee $20
Instructor $20
(Module ID 34410-12) 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
Instructor $20
(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.

Rigging (22.5 Hours)
Trainee $20
Instructor $20
(Module ID 34307-11) Explains the functions of towers and exchangers and the basic distillation process. Describes various types of towers and exchangers and their components.

Advanced Mechanical Trade Math (15 Hours)
Trainee $20
Instructor $20
(Module ID 34301-12) 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 Boilermaking Construction Drawings (20 Hours)
Trainee $20
Instructor $20
(Module ID 34410-12) 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)
Trainee $20
Instructor $20
(Module ID 08402-07; from Pipelifting Level Four)
Boilermaking Level 4 (continued)

**Stress Relieving** (10 Hours)

Trainee $20
Instructor $20

(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
Instructor $20

(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
Instructor $20

(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
Instructor $20

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

**Fundamentals of Crew Leadership** (20 Hours)

(Module ID 46101-11; see p. 69)

Trainee $43
Instructor $43


**Training**

**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.

**LEVEL 1**

**Carpentry**

**Training**

**Modular Training**

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
Instructor $20

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

**Building Materials, Fasteners, and Adhesives** (7.5 Hours)

Trainee $20
Instructor $20

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

**Hand and Power Tools** (7.5 Hours)

Trainee $20
Instructor $20

(Module ID 27103-13) Provides descriptions of hand tools and power tools used by carpenters. Emphasizes safe and proper operation, as well as care and maintenance.

**Introduction to Construction Drawings, Specifications, and Layout** (20 Hours)

Trainee $20
Instructor $20

(Module ID 27104-13) Covers the techniques for reading and using construction drawings and specifications, with an emphasis on drawings and information relevant to the carpentry trade. Introduces quantity takeoffs.

**Floor Systems** (27.5 Hours)

Trainee $20
Instructor $20

(Module ID 27105-13) Covers framing basics and the procedures for laying out and constructing a wood floor using common lumber, as well as engineered building materials.

**Wall Systems** (20 Hours)

Trainee $20
Instructor $20

(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
Instructor $20

(Module ID 27112-13) Describes types of roofs and provides instructions for laying out rafters for gable roofs, hip roofs, and valley intersections. Covers stick-built and truss-built roofs. Includes the basics of roof sheathing installation.

**Introduction to Building Envelope Systems** (12.5 Hours)

Trainee $20
Instructor $20

(Module ID 27109-13) Introduces the concept of the building envelope and explains its components. Describes types of windows, skylights, and exterior doors, and provides instructions for installation.

**Basic Stair Layout** (12.5 Hours)

Trainee $20
Instructor $20

(Module ID 27110-13) Introduces types of stairs and common building code requirements related to stairs. Focuses on techniques for measuring and calculating rise, run, and stairwell openings, laying out stringers, and fabricating basic stairways.
## L2  CARPENTRY FRAMING & FINISHING

### 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.

### MODULES

#### Commercial Drawings
- **Elective for Residential Path (25 Hours)**
  - **Trainee** $20
  - **Instructor** $20
  - (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
  - **Instructor** $20
  - (Module ID 27205-13) Describes the types and grades of steel framing materials, and includes instructions for selecting and installing metal framing for interior and exterior walls, loadbearing and nonbearing walls, partitions, and other applications.

#### Exterior Finishing
- **Elective for Commercial Path (35 Hours)**
  - **Trainee** $20
  - **Instructor** $20
  - (Module ID 27204-13) Covers the various types of exterior finish materials and their installation procedures, including wood, metal, vinyl, and fiber-cement siding.

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

#### Roofing Applications
- **Elective for Commercial Path (25 Hours)**
  - **Trainee** $20
  - **Instructor** $20
  - (Module ID 27202-13) Describes how to properly prepare the roof deck and install roofing for residential and commercial buildings.

### L3  CARPENTRY FORMS

### Curriculum Notes
- **160 Hours**
- Revised: 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.

### MODULES

#### Properties of Concrete
- **10 Hours**
  - **Trainee** $20
  - **Instructor** $20
  - (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**
  - **Trainee** $20
  - **Instructor** $20
  - (Module ID 38101-11; from Basic Rigging)

#### Rigging Practices
- **15 Hours**
  - **Trainee** $20
  - **Instructor** $20
  - (Module ID 38102-11; from Basic Rigging)

#### Trenching and Excavating
- **15 Hours**
  - **Trainee** $20
  - **Instructor** $20
  - (Module ID 27304-14) Explains the selection and uses of different types of reinforcing materials. Describes requirements for bending, cutting, splicing, and tying reinforcing steel and the placement of steel in footings and foundations, walls, columns, and beams and girders.

#### Foundations and Slabs-On-Grade
- **20 Hours**
  - **Trainee** $20
  - **Instructor** $20
  - (Module ID 27307-14) Covers basic site layout safety, tools, and methods; layout and construction of deep and shallow foundations; types of foundation forms; and forms used for curing and paving.

#### Vertical Formwork
- **22.5 Hours**
  - **Trainee** $20
  - **Instructor** $20
  - (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
  - **Instructor** $20
  - (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 choring and reshoring systems.
Carpentry Level 3 (continued)

Site Layout Two: Angular and Distance Measurement (37.5 Hours)
Trainee $20
Instructor $20
(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
Instructor $20
(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
Instructor $20
(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
Instructor $20
(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
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
Instructor $20
(Module ID 27407-14) Introduces the equipment, procedures, and safety practices used in cutting steel with oxyfuel equipment, as well as shielded metal arc welding, gas-tungsten arc welding, and gas metal arc welding. Labs include practice in cutting and welding techniques.

Site Preparation (7.5 Hours)
Trainee $20
Instructor $20
(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)
Trainee $43
Instructor $43
(Module ID 46101-11; see p. 69)

Cabinetmaking

PAPERBACK
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

PAPERBACK
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 NCER performance tests, and numerous teaching tips.
Concrete Finishing

L1 CONCRETE FINISHING

Curriculum Notes

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

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 S20 978-0-13-010253-9
Instructor S20 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 S20 978-0-13-010254-6
Instructor S20 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 S20 978-0-13-010255-3
Instructor S20 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 S20 978-0-13-010257-7
Instructor S20 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 S20 978-0-13-010258-4
Instructor S20 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 S20 978-0-13-010259-1
Instructor S20 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 S20 978-0-13-010250-8
Instructor S20 978-0-13-010260-7
(Module ID 23107) Describes basic finishing techniques for slabs and other horizontal structures. Explains the proper use of floats, travel, edges, and groovers. Discusses requirements for cutting joints using different types of saws. Provides hands-on practice for finishing concrete slabs.

Curing and Protecting Concrete (5 Hours)
Trainee S20 978-0-13-010261-4
Instructor S20 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 S20 978-0-13-010262-1
Instructor S20 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

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
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 S20 978-0-13-015047-9
Instructor S20 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 S20 978-0-13-015048-6
Instructor S20 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 S20 978-0-13-015049-3
Instructor S20 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 S20 978-0-13-015040-0
Instructor S20 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 S20 978-0-13-015051-6
Instructor S20 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 S20 978-0-13-015052-3
Instructor S20 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 S20 978-0-13-015053-0
Instructor S20 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 S20 978-0-13-015054-7
Instructor S20 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 toppings, epoxies, and shotcrete.

Quality Control (10 Hours)
Trainee S20 978-0-13-015055-4
Instructor S20 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 S20 978-0-13-015056-1
Instructor S20 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**

**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.nccerinc.com.

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**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)
- **Orienteation to the Trade** (2.5 Hours)  
  (Module ID 27101-13; from Craft Laboratory)
- **Building Materials, Fasteners, and Adhesives** (20 Hours)  
  (Module ID 27102-13; from Craft Laboratory)
- **Properties of Concrete** (10 Hours)  
  (Module ID 27303-14; from Craft Laboratory)
- **Site Layout One: Differential Leveling** (20 Hours)  
  (Module ID 27401-14; from Craft Laboratory)
- **Handling and Placing Concrete** (20 Hours)  
  (Module ID 27305-14; from Craft Laboratory)
- **Foundations and Slabs-On-Grade** (20 Hours)  
  (Module ID 27307-14; from Craft Laboratory)
- **Oxyfuel Cutting** (15 Hours)  
  (Module ID 54106-15; from Craft Laboratory)
- **Reinforcing Concrete** (15 Hours)  
  (Module ID 27304-14; from Craft Laboratory)
- **Vertical Formwork** (22.5 Hours)  
  (Module ID 27308-14; from Craft Laboratory)
- **Horizontal Formwork** (15 Hours)  
  (Module ID 27309-14; from Craft Laboratory)
- **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 Craft Laboratory)
- **Rough Terrain Forklifts** (22.5 Hours)  
  (Module ID 22206-13; from Heavy Equipment Operations Level Two)
- **Oxyfuel Cutting** (17.5 Hours)  
  (Module ID 27102-15; 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)

**L2  CONSTRUCTION CRAFT LABORER**

**Curriculum Notes**
- 147.5 Hours
- Updated: 2015, Third Edition

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**Construction Technology**

**HARDCOVER**

- **Trainee Guide:** $140  
  978-0-13-413039-2
- **Instructor's Guide:** $140  
  978-0-13-454300-0

**NCCERconnect**, our complete online solution, is available. Visit www.nccer.org/online-solutions for more information.

**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 Craft Laboratory)
- **Ceiling Joist and Roof Framing** (20 Hours)  
  (Module ID 27112-13; from Craft Laboratory)
- **Roofing Applications** (25 Hours)  
  (Module ID 27202-13; from Craft Laboratory)
- **Wall Systems** (20 Hours)  
  (Module ID 27111-13; from Craft Laboratory)
- **Exterior Finishing** (35 Hours)  
  (Module ID 27204-13; from Craft Laboratory)
- **Basic Stair Layout** (12.5 Hours)  
  (Module ID 27110-13; from Craft Laboratory)
- **Electrical Safety** (10 Hours)  
  (Module ID 54101-13; from Craft Laboratory)
- **Residential Electrical Services** (15 Hours)  
  (Module ID 26111-14; from Electrical Safety)
- **Introduction to HVAC** (7.5 Hours)  
  (Module ID 03101-13; from HVAC Level One)
### Construction Technology (continued)

**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 Pipe and Fittings** (12.5 Hours)
( Module ID 02107-12; from Plumbing Level One)

**Trainee $20**
**1-800-922-0579** www.nccer.org/bookstore

**Structures.**
structures, masonry construction, and concrete-formed and commercial buildings, including wood- and steel-framed and techniques used in building and finishing residential

**Instructor $20**

**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)

### Ordering information for Construction Technology, Third Edition:

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<td>Instructor’s Guide</td>
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### Drywall

**L1 DRYWALL**

**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
- A Spanish translation is available. Please see NCCER’s online catalog 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 Trade** (5 Hours)
( 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)
( 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.

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

**L2 DRYWALL**

**CURRICULUM NOTES**

- 145 Hours
- Published: 2009

**MODULES**

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

**Thermal and Moisture Protection** (7.5 Hours)
( 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)
( 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)
( Module ID 45105-07) Covers the materials, tools, and methods used to finish and patch gypsum drywall, including automatic and manual taping tools.

**Commercial Drawings** (25 Hours)
( Module ID 45201-08) Focuses on techniques for reading and using architectural and structural drawings and specifications.

**Steel Framing** (50 Hours)
( Module ID 45202-08) Describes the types and grades of steel framing and provides instructions for selecting and installing steel framing for interior walls, exterior nonbearing walls, and partitions. Also covers engineered framing systems.

**Acoustical Ceilings** (20 Hours)
( Module ID 45203-08) 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)
( Module ID 45204-08) 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)
( Module ID 45205-08) Covers a variety of specialized exterior finish products, such as EIFS, stucco, synthetic veneer stone, panelized cladding, and glass fiber-reinforced concrete (GFRC) panels.

**Specialty Finishes** (15 Hours)
( Module ID 45206-08) Covers the materials, tools, and application methods used for specialized interior finishes, such as sand, marble, clay, and Venetian plaster.

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**Stay Connected:**
**To Order Call: 1-800-922-0579**
**www.nccer.org/bookstore**
Introduction to the National Electrical Code®
(7.5 Hours)
Instructor $20  ISBN 978-0-13-384205-0
(Module ID 26105-14) 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)
Instructor $20  ISBN 978-0-13-384207-4
(Module ID 26104-14) 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)
Instructor $20  ISBN 978-0-13-384208-1
(Module ID 26107-14) 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)
(Module ID 26108-14) Introduces the types and applications of raceways, wireways, and ducts. Stresses the applicable NEC® requirements.

Conductors and Cables (10 Hours)
Instructor $20  ISBN 978-0-13-384210-4
(Module ID 26109-14) Focuses on the types and applications of conductors and covers proper wiring techniques. Stresses the applicable NEC® requirements.

Basic Electrical Construction Drawings (7.5 Hours)
(Module ID 26110-14) Describes electrical prints, drawings, and symbols, and the types of information that can be found on schematics, one-lines, and wiring diagrams.

Residential Electrical Services (15 Hours)
(Module ID 26111-14) Covers the electrical devices and wiring techniques common to residential construction and maintenance. Allows trainees to practice making service calculations. Stresses the applicable NEC® requirements.

Electrical Test Equipment (5 Hours)
(Module ID 26112-14) 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.

Electric Lighting (15 Hours)
Instructor $20  ISBN 978-0-13-387792-4
(Module ID 26203-14) 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)
Instructor $20  ISBN 978-0-13-387793-0
(Module ID 26204-14) Covers bends in conduit up to 6 inches. Focuses on mechanical, hydraulic, and electrical benders.

Pull and Junction Boxes (12.5 Hours)
(Module ID 26205-14) Explains how to select and size pull boxes, junction boxes, and handholes.

Conductor Installations (10 Hours)
(Module ID 26206-14) 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)
(Module ID 26207-14) Focuses on NEC® installation requirements for cable tray, including cable installations.

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)
Instructor $20  ISBN 978-0-13-387790-0
(Module ID 26201-14) 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)
(Module ID 26202-14) Covers AC and DC motors, including the main components, circuits, and connections.

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.)
• Updated: 2014 to reflect 2014 NEC® revision
• Instructor’s Guide includes access code to download TestGen software, module exams, PowerPoint®, and performance profile sheets from www.nccerirc.com.
• A Spanish translation of the 2008 NEC® version is available. Please see NCCER’s online catalog for more information.

HARDCOVER  ISBN
PAPERBACK  ISBN
Trainee Guide: $57  978-0-13-383065-1
Instructor’s Guide: $97  978-0-13-383073-6

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

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

L1 ELECTRICAL
LEVEL 1

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.)
• Updated: 2014 to reflect 2014 NEC® revision
• Instructor’s Guide includes access code to download TestGen software, module exams, PowerPoint®, and performance profile sheets from www.nccerirc.com.
• A Spanish translation of the 2008 NEC® version is available. Please see NCCER’s online catalog for more information.

HARDCOVER  ISBN
PAPERBACK  ISBN
Trainee Guide: $57  978-0-13-383065-1
Instructor’s Guide: $97  978-0-13-383073-6

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MODULES
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Alternating Current (17.5 Hours)
Instructor $20  ISBN 978-0-13-387790-0
(Module ID 26201-14) 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)
(Module ID 26202-14) Covers AC and DC motors, including the main components, circuits, and connections.

Electric Lighting (15 Hours)
Instructor $20  ISBN 978-0-13-387792-4
(Module ID 26203-14) 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)
Instructor $20  ISBN 978-0-13-387793-0
(Module ID 26204-14) Covers bends in conduit up to 6 inches. Focuses on mechanical, hydraulic, and electrical benders.

Pull and Junction Boxes (12.5 Hours)
(Module ID 26205-14) Explains how to select and size pull boxes, junction boxes, and handholes.

Conductor Installations (10 Hours)
(Module ID 26206-14) 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)
(Module ID 26207-14) Focuses on NEC® installation requirements for cable tray, including cable installations.
Conductor Terminations and Splices (7.5 Hours)
Trainee S20 ISBN 978-0-13-378789-4
(Module ID 26211-14) Gives basic descriptions of various types of conductors and relays along with their practical applications.

Grounding and Bonding (15 Hours)
Instructor S20 ISBN 978-0-13-378800-6
(Module ID 26210-14) Discusses fuses and circuit breakers along with their practical applications. Also covers sizing.

Circuit Breakers and Fuses (12.5 Hours)
Trainee S20 ISBN 978-0-13-378787-0
(Module ID 26209-14) Focuses on the purpose of grounding and bonding electrical systems. Thoroughly covers NEC® requirements.

Control Systems and Fundamental Concepts (12.5 Hours)
Trainee S20 ISBN 978-0-13-378789-4
(Module ID 26211-14) Gives basic descriptions of various types of contactors and relays along with their practical applications.

Hazardous Locations (15 Hours)
Instructor S20 ISBN 978-0-13-378927-0
(Module ID 26304-14) Presents the NEC® requirements for equipment installed in hazardous locations.

Overcurrent Protection (25 Hours)
(Module ID 26305-14) 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)
Instructor S20 ISBN 978-0-13-378925-6
(Module ID 26306-14) Discusses switchboards and switchgear, including installation, grounding, and maintenance requirements. Includes a set of drawings.

Transformers (12.5 Hours)
(Module ID 26307-14) Discusses transformer types, construction, connections, protection, and grounding.

Commercial Electrical Services (10 Hours)
(Module ID 26308-14) Covers the components, installation considerations, and NEC® requirements for commercial services.

Motor Controls (12.5 Hours)
(Module ID 26309-14) Covers calculations required to size conductors and overcurrent protection for motor applications.

Voice, Data, and Video (10 Hours)
Trainee S20 ISBN 978-0-13-378931-1
Instructor S20 ISBN 978-0-13-378921-8
(Module ID 26310-14) Covers installation, termination, and testing of voice, data, and video cabling systems.

Motor Controls (12.5 Hours)
Instructor S20 ISBN 978-0-13-378920-1
(Module ID 26311-14) Provides information on selecting, sizing, and installing motor controllers. Also covers control circuit pilot devices and basic relay logic.

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Load Calculations — Feeders and Services (20 Hours)
Trainee S20 ISBN 978-0-13-378802-0
Instructor S20 ISBN 978-0-13-378817-4
(Module ID 26401-14) Topics include basic calculation procedures for commercial and residential applications.

Health Care Facilities (10 Hours)
Trainee S20 ISBN 978-0-13-378804-4
Instructor S20 ISBN 978-0-13-378818-1
(Module ID 26402-14) 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)
Instructor S20 ISBN 978-0-13-378819-8
(Module ID 26403-14) Explains the NEC® requirements for electric generators and storage batteries.

Basic Electronic Theory (10 Hours)
Instructor S20 ISBN 978-0-13-378820-4
(Module ID 26404-14) Explains the function and operation of basic electronic devices, including semiconductors, diodes, rectifiers, and transistors.

Fire Alarm Systems (15 Hours)
Instructor S20 ISBN 978-0-13-378821-1
(Module ID 26405-14) Covers fire alarm control units, Digital Alarm Communicator Systems (DACS), wiring for alarm initiating and notification devices, and alarm system maintenance.

Specialty Transformers (10 Hours)
Instructor S20 ISBN 978-0-13-378822-8
(Module ID 26406-14) Covers various types of transformers and their applications. Also provides information on selecting, sizing, and installing these devices.

Advanced Controls (20 Hours)
(Module ID 26407-14) 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)
(Module ID 26408-14) Provides a basic overview of HVAC systems and their controls. Also covers electrical troubleshooting and NEC® requirements.

Heat Tracing and Freeze Protection (10 Hours)
(Module ID 26409-14) Covers heat tracing systems along with their applications and installation requirements.

To Order Call: 1-800-922-0579  Stay Connected:  www.nccer.org/bookstore
Electrical Level 4 (continued)

Motor Operation and Maintenance (10 Hours)
Trainee $20
Instructor $20
(Module ID 26410-14) Covers motor cleaning, testing, and preventive maintenance. Also describes basic troubleshooting procedures.

Medium-Voltage Terminations/Splices (10 Hours)
Trainee $20
Instructor $20
(Module ID 26411-14) Offers an overview of the NEC® and cable manufacturers’ requirements for medium-voltage terminations and splices.

Special Locations (20 Hours)
Trainee $20
Instructor $20
(Module ID 46101-11) Describes the NEC® and the Instructor’s Guide. The following ISBN and module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com. All of the modules listed below are included in the Trainee Guide and the Instructor’s Guide. The following ISBN and prerequisite for Level 1 completion and must be purchased separately. See p. 11 for ordering information.)

Overview of Nurse Call and Signaling Systems 33409-12
Instructor $20
Trainee Guide: $50

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
Instructor Guide: $125

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

Managing Electrical Hazards
12.5 Hours
Updated: 2015, Third Edition
1-800-344-3555.

Electronic Systems Technician

Introduction to the Trade (2.5 Hours)
Trainee $20
Instructor $20
(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
Instructor $20
(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
Instructor $20
(Module ID 33103-10) Describes 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.

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

Hand Bending of Conduit (7.5 Hours)
Trainee $20
Instructor $20
(Module ID 33106-10) Introduces conduit bending and installation. Covers techniques for using hand-operated conduit benders, as well as cutting, reaming, and threading conduit.

Introduction to the National Electrical Code® (7.5 Hours)
Trainee $20
Instructor $20
(Module ID 33107-10) Provides a road map for using the NEC® by introducing the layout and the types of information found within the code book. Allows trainees to practice finding information using an easy-to-follow procedure.
Low-Voltage Cabling (20 Hours)
(Module ID 33201-10) Introduces electrical concepts used in Ohm’s law as applied to DC series circuits. Describes atomic theory, electromagnetic force, resistance, and electrical power equations. Introduces series, parallel, and series-parallel DC circuits. Covers Kirchhoff’s voltage and current laws and circuit analysis.

AC Circuits (20 Hours)
(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, and RLC circuits using math and vector analysis.

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

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

Test Equipment (10 Hours)
Instructor $20  ISBN 978-0-13-266169-0
(Module ID 33205-10) Covers the selection, inspection, use, and maintenance of basic test equipment used in low-voltage work. Also covers specialized test equipment such as signal generators, wattmeters, cable testers, and RF analyzers.

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

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

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

Wire and Cable Terminations (25 Hours)
Instructor $20  ISBN 978-0-13-266174-4
(Module ID 33209-10) Provides information and instructions for selecting, installing, and testing connectors and other terminating devices on cables used in low-voltage work, including telecommunications, video and audio, and fiber optics.

Power Quality and Grounding (20 Hours)
Instructor $20  ISBN 978-0-13-266175-1
(Module ID 33210-10) Covers grounding and bonding of electrical systems. Discusses NEC® regulations pertaining to grounding and bonding. Covers equipment and devices used for grounding and bonding, including their methods of installation. Explains power quality, along with the causes and effects of poor power quality.

Fiber Optics (25 Hours)
(Module ID 33301-11) Introduces the types of equipment and methods used in fiber-optic cable installation.

Wireless Communication (10 Hours)
Instructor $20  ISBN 978-0-13-266385-4
(Module ID 33302-11) Introduces operating principles and equipment used in radio frequency (RF) and infrared (IR) wireless communication systems. Covers RF communication systems, IR-controlled systems, power line carrier (PLC) systems, RF and IR wireless computer networks, and satellite communication systems. Discusses the equipment used for testing and troubleshooting wireless communication systems.

Site Survey, Project Planning, and Documentation (15 Hours)
Instructor $20  ISBN 978-0-13-266386-1
(Module ID 33304-11) Explains planning a job from start to finish, including how to perform site surveys for new and retrofit construction projects. Covers drawings, specifications, and other documents commonly used.

Fundamentals of Crew Leadership (20 Hours)

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Electronic Systems Technician Level 3 (continued)

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

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

Broadband Systems (40 Hours)
Trainee $20  ISBN 978-0-13-292258-4
(Module ID 33403-12) Describes the major elements of head-end design for specialized television systems, including CATV, SMATV, and MATV systems. Explains the function and operation of receivers, modulators, amplification, and distribution devices. Discusses proper signal levels, cable attenuation, insertion loss, and acceptable carrier-to-noise levels. Covers common test equipment and troubleshooting procedures.

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

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

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

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

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

Overview of Nurse Call and Signaling Systems (15 Hours)
Instructor $20  ISBN 978-0-13-292276-0
(Module ID 33409-12) Presents an overview of nurse call and signaling systems as found in hospitals and other health-care facilities. Covers basic emergency call and duress system requirements based on facility type. Identifies installation requirements based on UL and other building code specifications.

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

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


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

Audio Systems (30 Hours)
Instructor $20  ISBN 978-0-13-292267-8
(Module ID 33401-12) Introduces and explains audio system components, including input sources, amplifiers, signal processing equipment, and output equipment. Describes power requirements, cabling options, system configuration, and basic design considerations. Reviews common test equipment used for installation and troubleshooting.

Satellite Fundamentals, Home Theater Fundamentals, and Media Management Systems (30 Hours)
Trainee $20  ISBN 978-0-13-292258-4
(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.

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

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

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

Overview of Nurse Call and Signaling Systems (15 Hours)
Instructor $20  ISBN 978-0-13-292276-0
(Module ID 33409-12) Presents an overview of nurse call and signaling systems as found in hospitals and other health-care facilities. Covers basic emergency call and duress system requirements based on facility type. Identifies installation requirements based on UL and other building code specifications.

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

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

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Heavy Equipment Operations

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

Introduction to Earthmoving (12.5 Hours)
Trainee $20
Instructor $20
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
Instructor $20
(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.

Excavation Math (17.5 Hours)
Trainee $20
Instructor $20
(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
Instructor $20
(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
Instructor $20
(Module ID 22210-13) Expands on information covered in Level 1 in relation to setting and interpreting grade stakes. Also provides information and instructions on controlling surface water and ground water on a job site, as well as the layout of foundations and laying of pipe.

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

Skid Steers (22.5 Hours)
Trainee $20
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
Instructor $20
(Module ID 22205-13) Covers the uses of wheel and track loaders, as well as operator maintenance, loader safety, and operating procedures. Includes procedures for using loaders in excavation, grading, and demolition work.

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

**Finishing and Grading (25 Hours)**
- Trainee: $20
- Instructor: $20
- (Module ID 22303-14) Identifies and describes the common uses, types, components, instruments, controls, and attachments of backhoes. Presents safety guidelines, prestart inspection procedures, and preventive maintenance requirements. Describes basic startup and operation, and covers common work activities associated with backhoes.

**Motor Graders (40 Hours)**
- Trainee: $20
- Instructor: $20
- (Module ID 22302-14) Identifies and describes the common uses, types, and components of dozers. Presents safety guidelines, prestart inspection procedures, and preventive maintenance requirements. Covers compaction equipment; and prestart inspections, preventive maintenance, and proper operating procedures. Presents factors involved in work activities associated with a roller.

**Off-Road Dump Trucks (30 Hours)**
- Trainee: $20
- Instructor: $20
- (Module ID 22310-14) 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.

**Dozers**
- Trainee: $20
- Instructor: $20
- (Module ID 22302-14) Identifies and describes the common uses, types, and components of dozers. Presents safety guidelines, prestart inspection procedures, and preventive maintenance requirements. Covers compaction equipment; and prestart inspections, preventive maintenance, and proper operating procedures. Presents factors involved in work activities associated with a roller.

**Compaction Equipment (25 Hours)**
- Trainee: $20
- Instructor: $20
- (Module ID 22303-14) 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.

**Excavators (25 Hours)**
- Trainee: $20
- Instructor: $20
- (Module ID 22304-14) Identifies and describes the common uses, types, 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.

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**Heavy Highway Construction**

**Orientation to the Trade (7.5 Hours)**
- Trainee: $20
- Instructor: $20
- (Module ID 36101-16) 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
- Instructor: $20
- (Module ID 36110-16) Expands on the safety coverage in the Core Curriculum, focusing on issues specific to highway and bridge work such as traffic safety, full protection, working above or around water, confined spaces, and environmental hazards.

**Identification of Equipment Used in Heavy Highway Construction (10 Hours)**
- Trainee: $20
- Instructor: $20
- (Module ID 36112-16) 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.

**Excavation Math (17.5 Hours)**
- Trainee: $20
- Instructor: $20
- (Module ID 22207-13; from Heavy Equipment Operations Level 2)

**Reinforcing Concrete (15 Hours)**
- Trainee: $20
- Instructor: $20
- (Module ID 27304-14; from Carpentry Level 3)

**Working with Concrete (15 Hours)**
- Trainee: $20
- Instructor: $20
- (Module ID 27104-16; from Masonry Level 3)

Ordering information for Heavy Highway Construction, First Edition:

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- Trainee Guide: $67
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L2 HEAVY HIGHWAY CONSTRUCTION

Curriculum Notes

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- 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.
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PAPERSBACK ISBN
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Instructor Guide: $20 978-0-13-448595-0

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.

Introduction to Earthmoving (12.5 Hours)
(Module ID 22201-12; from Heavy Equipment Operations Level 2)
Trainee S20 978-0-13-292310-1
Instructor S20 978-0-13-292317-0

Site Work (20 Hours)
(Module ID 22210-13; from Heavy Equipment Operations Level 2)
Trainee S20 978-0-13-340326-8
Instructor S20 978-0-13-340336-7

Interpreting Civil Drawings (20 Hours)
(Module ID 22209-13; from Heavy Equipment Operations Level 2)
Trainee S20 978-0-13-340325-1
Instructor S20 978-0-13-340335-0

Work-Zone Safety (5 hours)
(Module ID 75104-13; from Field Safety)
Trainee S20 978-0-13-340361-9
Instructor S20 978-0-13-340370-1

Plant Operations (7.5 Hours)
Trainee S20 978-0-13-448584-3
Instructor S20 978-0-13-448583-6
(Module ID 36107-16) 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 S20 978-0-13-448586-7
Instructor S20 978-0-13-448585-0
(Module ID 36108-16) 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.

Deep Foundations (10 Hours)
Trainee S20 978-0-13-448591-1
Instructor S20 978-0-13-448590-4
(Module ID 36202-16) 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 S20 978-0-13-448593-5
Instructor S20 978-0-13-448592-8
(Module ID 36203-16) 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.

PAPERSBACK ISBN
Trainee Guide: $22 978-0-13-294870-8
Instructor Guide: $22 978-0-13-294915-6


HVAC

L1 HVAC

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
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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 S20 978-0-13-340339-8
Instructor S20 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.

Deep Foundations (10 Hours)
Trainee S20 978-0-13-448591-1
Instructor S20 978-0-13-448590-4

- 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.

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HVAC Level 1 (continued)

Trade Mathematics (10 Hours)
Trainee $20
Instructor $20
(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
Instructor $20
(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
Instructor $20
(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
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
Instructor $20
(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
Instructor $20
(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
Instructor $20
(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
Instructor $20
ISBN 978-0-13-340348-0
(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.

Curriculum Notes
- 170 Hours
- Revised: 2013, Fourth Edition
- NATE-Recognized Training Provider

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Instructor’s Package: $97

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Alternating Current (10 Hours)
Trainee $20
Instructor $20
(Module ID 03206-13) Covers transformers, single-phase and three-phase power distribution, capacitors, the theory and operation of induction motors, and the instruments and techniques used in testing AC circuits and components. Also reviews electrical safety.

Compressors (12.5 Hours)
Trainee $20
Instructor $20
(Module ID 03302-13) Explains operating principles of compressors used in comfort air conditioning and refrigeration systems. Includes installation, service, and repair procedures.

Refrigerants and Oils (12.5 Hours)
Trainee $20
Instructor $20
(Module ID 03303-13) 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
Instructor $20
(Module ID 03205-13) Covers refrigerant handling and equipment servicing procedures for HVAC systems in an environmentally safe manner.

Heat Pumps (20 Hours)
Trainee $20
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.

Sheet Metal Duct Systems (10 Hours)
Trainee $20
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
Instructor $20
(Module ID 03213-13) Covers layout, fabrication, installation, and insulation of sheet metal ductwork. Also includes selection and installation of registers, diffuse, dampers, and other duct accessories.

Fiberglass and Flexible Duct Systems (7.5 Hours)
Trainee $20
Instructor $20
(Module ID 03214-13) Covers the layout, fabrication, installation, and joining of fiberglass ductwork and fittings. Describes the proper methods for attaching and supporting a duct.

Commercial Airside Systems (12.5 Hours)
Trainee $20
Instructor $20
(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
Instructor $20
(Module ID 03204-13) Covers principles, processes, and devices used to control humidity and air cleanliness, as well as devices used to conserve energy in HVAC systems.
Introduction to Hydronic Systems (12.5 Hours)
(Module ID 03303-13) Introduces hot water heating systems, focusing on safe operation of the low-pressure boilers and piping systems in residential applications.

Troubleshooting Oil Heating (12.5 Hours)
(Module ID 03301-03) 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 S20  ISBN 978-0-13-382438-4
Instructor S20 ISBN 978-0-13-387136-6
(Module ID 03305-13) Introduces the information and skills needed to troubleshooting various air treatment accessories used with heating and cooling equipment.

Commercial Hydronic Systems (10 Hours)
Instructor S20 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 S20  ISBN 978-0-13-378112-0
(Module ID 03306-13) Focuses on the use of steam for storing and moving energy in HVAC systems. Reviews the fundamentals of water that relate to steam and describes the basic steam system cycle. Discusses a steam system’s operational components—steam boilers and their accessories and controls; steam system loads, including heat exchangers/converters; and terminal devices. Steam system valves and piping are covered in detail, including common types of piping arrangements; the components of a condensate return/feederwater system; steam and condensate pipe sizing; and pressure-reducing valves and thermostatic valves.

Retail Refrigeration System (15 Hours)
(Module ID 03304-13) Covers the applications, principles, and troubleshooting of retail refrigeration systems.

Customer Relations (5 Hours)
(Module ID 03316-13) Covers the applications, principles, and troubleshooting of retail refrigeration systems.

To Order Call: 1-800-922-0579 www.nccer.org/bookstore
HVAC Level 4 (continued)

System Startup and Shutdown (15 Hours)
(Module ID 03401-13) Teaches how to interpret drawings used in commercial construction, including mechanical drawings, specifications, shop drawings, and as-builds. Explains how to perform takeoff procedures for equipment, fittings, ductwork, and other components.

Construction Drawings and Specifications (12.5 Hours)
Instructor $20 ISBN 978-0-13-378172-4
(Module ID 03407-13) Identifies factors that affect heating and cooling loads. Explains the process by which heating and cooling loads are calculated, and how load calculations are used in the selection of heating and cooling equipment. Covers basic types of duct systems and their selection, sizing, and installation requirements.

Heating and Cooling System Design (22.5 Hours)
Instructor $20 ISBN 978-0-13-378173-1
(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)

Commercial/Industrial Refrigeration Systems (20 Hours)
(Module ID 03408-13) Expands on the study of product and process refrigeration equipment by describing systems used in cold storage and food processing applications, as well as transportation refrigeration. Various types of defrost systems are covered in detail.

Alternative and Specialized Heating and Cooling Systems (10 Hours)
(Module ID 03409-13) Describes alternative devices used to reduce energy consumption, including wood, coal, and pellet-fired systems, waste-oil heaters, geothermal heat pumps, solar heating, in-floor radiant heating, and direct-fired makeup units. Also introduces application-specific computer room environmental and air turnover systems.

Heating and Cooling System Design (22.5 Hours)
Instructor $20 ISBN 978-0-13-378173-1
(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.

Industrial Coating and Lining Application Specialist

Basic Rigging (20 Hours)
(Module ID 00106-04; from Core Curriculum)

Introduction to the Trade (5 Hours)
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 (45 Hours)
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)
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 (35 Hours)
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 (15 Hours)
(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.

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L1 INDUSTRIAL COATING AND LINING APPLICATION SPECIALIST

**Curriculum Notes**
- 150 Hours
- Published: 2009
- Core Curriculum is not a prerequisite for Industrial Coatings and Lining Application Specialist.

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)

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

**SPLIRAL ROOND**

**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

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**NCCE and NACE International**
NCCE 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 NCCE/NACE Industrial Coating Applicator Training and Certification Program follows the standard on Industrial Coating and Lining Application Specialist Qualification available from NACE International.
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 and Lining Application Specialist

Level 2

Curriculum Notes
- 320 Hours
- Revised: 2010

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

Corrosion Protection (5 Hours)
Trainee $20
Instructor $20
(ISModule 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
Instructor $20
(ISModule 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
Instructor $20
(ISModule 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
Instructor $20
(ISModule 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
Instructor $20
(ISModule 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
Instructor $20
(ISModule 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

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

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

Oxygen Fuel Cutting (17.5 Hours)
Trainee $20
Instructor $20
(ISModule 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.

Construction Drawings (12.5 Hours)
Trainee $20
Instructor $20
(ISModule 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 Drives (5 Hours)
Trainee $20
Instructor $20
(ISModule 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.

To Order Call: 1-800-922-0579  Stay Connected  www.nccer.org/bookstore
Industrial Maintenance Electrical & Instrumentation Technician Level 1 (continued)

**Valves** (5 Hours)

Trainee $20  
Instructor $20  
(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  
Instructor $20  
(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  
Instructor $20  
(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  
Instructor $20  
(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  
Instructor $20  
(Module ID 40113-07) Explains lubrication safety, storage, and classifications. Also explains selecting lubricants, additives, lubrication equipment, and lubricating charts.

**Introduction to the National Electrical Code®** (5 Hours)

Trainee $20  
Instructor $20  
(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  
Instructor $20  
(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  
Instructor $20  
(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  
Instructor $20  
(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  
Instructor $20  
(Module ID 40206-08) Presents devices used to measure flow, pressure, level, and temperature, along with their principles of operation.

**Process Mathematics** (10 Hours)

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

**Hand Bending** (10 Hours)

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

**Tubing** (15 Hours)

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

**Clean, Purge, and Test Tubing and Piping Systems** (7.5 Hours)

Trainee $20  
Instructor $20  
(Module ID 40210-08) 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  
Instructor $20  
(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  
Instructor $20  
(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  
Instructor $20  
(Module ID 40213-08) Describes methods of terminating and splicing conductors of all types and sizes, including preparing and taping conductors.

**Hazardous Locations** (10 Hours)

Trainee $20  
Instructor $20  
(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  
Instructor $20  
(Module ID 40302-09) Introduces the principles of electronics and semiconductor theory, components, and applications.
Pneumatic Controls (15 Hours)
Trainee $20
Instructor $20
(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
Instructor $20
(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.

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

Pneumatic Control Valves, Actuators, and Transmitters (15 Hours)
Trainee $20
Instructor $20
(Module ID 40404-09) 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.

Instructor Guide includes access code to download TestGen profile sheets from www.nccerirc.com.

Trainee Guide: $97
Instructor’s Guide: $97
ISBN 978-0-13-609955-0

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

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

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

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

Distributed Control Systems (17.5 Hours)
Trainee $20
Instructor $20
(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.
Industrial Maintenance Mechanic

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

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 (25 Hours)
Trainee S20 978-0-13-614583-7
Instructor S20 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 S20 978-0-13-614584-4
Instructor S20 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 S20 978-0-13-614585-1
Instructor S20 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 S20 978-0-13-614586-8
Instructor S20 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 S20 978-0-13-614588-2
Instructor S20 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 S20 978-0-13-614589-9
Instructor S20 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 S20 978-0-13-614590-5
Instructor S20 978-0-13-614604-9
(Module ID 32107-07) Introduces plot plans, structural drawings, elevation drawings, as-built drawings, equipment arrangements drawings, P&IDs, isometric drawings, basic circuit diagrams, and detail sheets.

Pumps and Drivers (5 Hours)
Trainee S20 978-0-13-614591-2
Instructor S20 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 S20 978-0-13-614592-9
Instructor S20 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 S20 978-0-13-614593-6
Instructor S20 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 S20 978-0-13-614594-3
Instructor S20 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 S20 978-0-13-614560-8
Instructor S20 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 S20 978-0-13-614562-2
Instructor S20 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.

Low-Pressure Steam Systems (10 Hours)
Trainee S20 978-0-13-604628-8
Instructor S20 978-0-13-604675-2
(Module ID 32208-07) Introduces steam, fuel oil, steam, and water systems. Explains how to identify piping systems according to color codes.

Hydrostatic and Pneumatic Testing (10 Hours)
Trainee S20 978-0-13-604626-4
Instructor S20 978-0-13-604673-8
(Module ID 32209-07) Describes non-destructive and pressure testing of systems and equipment.

Introduction to Bearings (15 Hours)
Trainee S20 978-0-13-604627-1
Instructor S20 978-0-13-604674-5
(Module ID 32207-07) Introduces plain, ball, roller, thrust, guide, flanged, pillow block, and taper bearings. Discusses bearing materials and designations.

High-Pressure Steam Systems and Auxiliaries (20 Hours)
Trainee S20 978-0-13-604664-6
Instructor S20 978-0-13-604676-9
(Module ID 32209-07) Explains the functioning of high-pressure steam systems used in industry.

Contact Information:
To Order Call: 1-800-922-0579
Stay Connected: www.nccer.org/bookstore
Distillation Towers and Vessels (20 Hours)
Trainee $20
Instructor $20
(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
Instructor $20
(Module ID 32211-07) Introduces equipment used to transfer and remove heat from systems in process.

Introduction to Tube Work (10 Hours)
Trainee $20
Instructor $20
(Module ID 32212-07) Covers the basics of working with heat exchanger and furnace tubing and tube sheets.

Setting Baseplates and Prealignment (30 Hours)
Trainee $20
Instructor $20
(Module ID 32301-08) 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 Mechanical Seals (20 Hours)
Trainee $20
Instructor $20
(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.

Compressors and Pneumatic Systems (35 Hours)
Trainee $20
Instructor $20
(Module ID 32401-09) Introduces human resource criteria, concepts, and skills for the craftsperson desiring to advance to leadership roles.

Reverse Alignment (30 Hours)
Trainee $20
Instructor $20
(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.

Troubleshooting and Repairing Conveyors (15 Hours)
Trainee $20
Instructor $20
(Module ID 32502-09) Describes maintaining and repairing belt, roller, chain, screw, and pneumatic conveyors.

Curriculum Notes
• 175 Hours
• Revised: 2018, Third Edition
• Instructor’s Guide includes access code to download TestGen software, module exams, PowerPoint®, and performance profile sheets from www.nccerirc.com.

PAPERBACK ISBN
Trainee Guide: $97
978-0-13-604649-3
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
Instructor $20
(Module ID 32302-08) Explains how to select, inspect, use and care for levels, feeler gauges, calipers, micrometers, height gauges and surface plates, dial indicators, protractors, parallels and gauge blocks, trammels, and pyrometers.

Troubleshooting and Repairing Pumps (10 Hours)
Trainee $20
Instructor $20
(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
Instructor $20
(Module ID 32408-09) Describes types and operation of gearboxes, and gearbox diagnostics. Explains how to troubleshoot, remove, and disassemble gearboxes, how to identify gear wear patterns, and how to install and maintain gearboxes.

Curriculum Notes
• 170 Hours
• Revised: 2009, Third Edition
• Instructor’s Guide includes access code to download TestGen software, module exams, PowerPoint®, and performance profile sheets from www.nccerirc.com.

PAPERBACK ISBN
Trainee Guide: $97
978-0-13-604689-7
Instructor’s Guide: $97
978-0-13-604959-8

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
Instructor $20
(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
Instructor $20
(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.

Advanced Topics
Advanced Towers and Vessels (15 Hours)
Trainee $20
Instructor $20
(Module ID 32501-09) Introduces the basics of reactor and refinery processes, including cat crackers, vacuum, and distillation. Also teaches the use of hydraulic torqueing and tensioning equipment.

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

### L1 INSTRUMENTATION

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

#### 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**
- **Instructor $20**

**Hand and Power Tools for Instrumentation (12.5 Hours)**
- **Trainee $20**
- **Instructor $20**

**Craft-Related Mathematics (10 Hours)**
- **Trainee $20**
- **Instructor $20**

**Instrument Drawings and Documents Part One (7.5 Hours)**
- **Trainee $20**
- **Instructor $20**

**Inspect, Handle, and Store Instrumentation Materials (2.5 Hours)**
- **Trainee $20**
- **Instructor $20**

#### Electrical Systems for Instrumentation (12.5 Hours)

**Trainee $20**

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**Fasteners (7.5 Hours)**
- **Trainee $20**
- **Instructor $20**

**Gaskets, O-Rings, and Packing (10 Hours)**
- **Trainee $20**
- **Instructor $20**

**Lubricants, Sealants, and Cleaners (7.5 Hours)**
- **Trainee $20**
- **Instructor $20**

**Tubing (15 Hours)**
- **Trainee $20**
- **Instructor $20**

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

**Hoses (7.5 Hours)**
- **Trainee $20**
- **Instructor $20**

**L2 INSTRUMENTATION**

#### Curriculum Notes
- **182.5 Hours**
- **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.

#### MODULAS

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**
- **Instructor $20**

**Instrument Fitter’s Math (15 Hours)**
- **Trainee $20**
- **Instructor $20**

**Instrument Drawings and Documents, Part Two (17.5 Hours)**
- **Trainee $20**
- **Instructor $20**

**Panel-Mounted Instruments (10 Hours)**
- **Trainee $20**
- **Instructor $20**

**Installing Field-Mounted Instruments (25 Hours)**
- **Trainee $20**
- **Instructor $20**

**Raceways for Instrumentation (17.5 Hours)**
- **Trainee $20**
- **Instructor $20**

**Clean, Purge, and Test Tubing and Piping Systems (10 Hours)**
- **Trainee $20**
- **Instructor $20**

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www.nccer.org/bookstore
Instrumentation Level 2 (continued)

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

Layout and Installation of Tubing and Piping Systems (35 Hours)
Trainee $20
Instructor $20
(Module ID 12302-15) Introduces piping and tubing layout procedures. Explains the steps in creating a hand-sketch isometric drawing that can be applied in 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
Instructor $20
(Module ID 12210-15) Presents the construction, operation, and uses of filters, regulators, and dryers. Covers identification and selection of the correct component for installation using applicable specifications and schematics.

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

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

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

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

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

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

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

Ordering information for Instrumentation, Level 3, Second Edition:

PAPERBACK
Trainee Guide: $97
978-0-13-102603-2
Instructor’s Package: $97
978-0-13-102605-6

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

LEVEL 3

Curriculum Notes
REVISED!

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• To Be 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

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
Instructor $20
(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
Instructor $20
(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
Instructor $20
ISBN 978-0-13-448303-0
(Module ID 12405-16) Introduces the techniques used in tuning loops employing PID control. Includes basic tuning theory and formulas. Examines open, close, and visual loop tuning methods.

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

Programmable Logic Controllers (12.5 Hours)
Trainee $20
Instructor $20
(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  
  **Instructor**: $20  
  (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  
  **Instructor**: $20  
  (Module ID 12409-16) Introduces maintenance and the increasingly important aspect of DCS security.

### Analyzers and Monitors (30 Hours)
- **Trainee**: $20  
  **Instructor**: $20  
  Identifies 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.

### Ordering Information for Instrumentation, Level 4, Second Edition:
- **PAPERBACK**  
  - **Trainee Guide**: $97  
    **ISBN 978-0-13-108922-8**  
  - **Instructor’s Package**: $97  

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### 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**
- A Spanish translation is available. Please see NCCER’s online catalog for more information.

**L1 IRONWORKING**

### Modules

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

**Introduction to the Trade** (5 Hours)
- **Trainee**: $20  
  **Instructor**: $20  
  **ISBN 978-0-13-213714-0**  
  (Module ID 30101-11) Describes 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  
  **Instructor**: $20  
  **ISBN 978-0-13-213701-7**  
  (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  
  **Instructor**: $20  
  **ISBN 978-0-13-213803-1**  
  (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  
  **Instructor**: $20  
  (Module ID 30104-11) Explains how to recognize A-325 and A-490 bolts, washers, and nuts. Describes how to correctly tension bolts and explains procedures for calibrated wrench and turn-of-nut tightening methods.

**Mobile Construction Cranes** (10 Hours)
- **Trainee**: $20  
  **Instructor**: $20  
  (Module ID 30105-11) Identifies common lifting equipment and construction cranes. Describes how to use crane manuals, perform record keeping, and follow safety requirements. Provides procedures for assembling construction cranes.

**Rigging Equipment** (10 Hours)
- **Trainee**: $20  
  **Instructor**: $20  
  (Module ID 30106-11) Describes the use and inspection of equipment and hardware used in rigging. Describes slings and explains how to determine sling capacities and angles. Covers the selection and inspection of rigging equipment, including block and tackles, chain hoists, come-alongs, jacks, and jiggers.

**Rigging Practices** (15 Hours)
- **Trainee**: $20  
  **Instructor**: $20  
  **ISBN 978-0-13-213510-3**  
  (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  
  **Instructor**: $20  
  **ISBN 978-0-13-213513-0**  
  (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  
  **Instructor**: $20  
  **ISBN 978-0-13-213514-7**  
  (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  
  **Instructor**: $20  
  (Module ID 30110-11) Identifies the use and inspection of plumbing, aligning and guying construction cranes, the tools that are used, and the procedures for performing the plumbing and aligning. Identifies and explains column base and baseplate components and foundation failures.

**Oxyfuel Cutting** (17.5 Hours)
- **Trainee**: $20  
  **Instructor**: $20  
  (Module ID 30111-11) Identifies welding equipment and processes. Describes safety precautions associated with arc welding. Explains how to identify weld joints, their dimensions, and applications from welding symbols and drawings. Describes how to set up and use SAW equipment and explains the governing welding codes.

**Bar Joists and Girders** (5 Hours)
- **Trainee**: $20  
  **Instructor**: $20  
  **ISBN 978-0-13-213516-6**  
  (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 SAW equipment and explains the governing welding codes.

**Metal Decking** (10 Hours)
- **Trainee**: $20  
  **Instructor**: $20  
  **ISBN 978-0-13-213517-3**  
  (Module ID 30113-11) Identifies decking types and profiles and how decking is packaged, shipped, and stored. Describes erecting decking and job-site safety. Discusses the effects of deck penetrations and damage. Includes OSHA Subpart R.
Ironworking Level 1 (continued)

Field Fabrication (15 Hours)
Trainee $20
Instructor $20
(Module ID 30115-11) Identifies the safety hazards associated with field fabrication. Describes how to use common layout tools. Explains how to fabricate angle iron, channel, T-shapes, and W-shapes to given dimensions.

L2 IRONWORKING

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
Instructor’s Guide: $97
978-0-13-257822-6
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
Instructor $20
(Module ID 30201-11) Explains fractions and basic math, and includes multiple opportunities for practical applications.

Weld Quality (10 Hours)
Trainee $20
Instructor $20
(Module ID 29106-09; from Welding Level One) Explains how to prepare arc welding equipment and how to make flat welds, horizontal positions, and open V-butt welds. Describes how to perform arc welding equipment and how to make flat welds, horizontal welds, vertical welds, and overhead welds.

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

Structural Ironworking Two (30 Hours)
Trainee $20
Instructor $20
(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
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
Instructor $20
(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
Instructor $20
(Module ID 30208-11) Identifies survey equipment and uses. Explains the proper set up and use of a builder’s level and a theodolite. Covers how to shoot elevations, sweep a column for plumb, and set up over a point and back sight to another point.

Survey Equipment Use and Care Two (10 Hours)
Trainee $20
Instructor $20
(Module ID 30209-11) Describes survey equipment and uses. Explains the proper set up and use of a builder’s level and a theodolite. Covers how to shoot elevations, sweep a column for plumb, and set up over a point and back sight to another point.

Survey Equipment Use and Care Three (20 Hours)
Trainee $20
Instructor $20
ISBN 978-0-13-266460-0
(Module ID 30210-11) Describes survey equipment and uses. Explains the proper set up and use of a builder’s level and a theodolite. Covers how to shoot elevations, sweep a column for plumb, and set up over a point and back sight to another point.

Advanced Rigging (10 Hours)
Trainee $20
Instructor $20

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
Instructor’s Guide: $97
978-0-13-257785-4
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
Instructor $20
(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 (10 Hours)
Trainee $20
Instructor $20
(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.

To Order Call: 1-800-922-0579
Ironworking Level 3 (continued)

Grating and Checkered Plate (5 Hours)
Trainee: $20  Instructor: $20
(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 gratings and checker plate.

Air Carbon Arc Cutting and Gouging (12.5 Hours)
Trainee: $20  Instructor: $20
(Module ID 29104-09; from Welding Level One) Describes the procedures for the installation and attachment of gratings and checker plate. Describes the rigging methods associated with gratings and checker plate. Describes the rigging methods associated with gratings and checker plate.

Demolition (10 Hours)
Trainee: $20  Instructor: $20
(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

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

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

Mortar (10 Hours)
Trainee: $20  Instructor: $20
(Module ID 28104-13) Explains the types and properties of mortar and the materials used in the mixture, including admixtures; provides instructions for mixing mortar by machine; and describes how to properly apply and store mortar.

Masonry Units and Installation Techniques (60 Hours)
Trainee: $20  Instructor: $20
(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.

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

Masonry Safety (15 Hours)
Trainee: $20  Instructor: $20
(Module ID 28107-13) 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 Openings and Metalwork (20 Hours)
Trainee: $20  Instructor: $20
(Module ID 28201-13) 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  Instructor: $20
(Module ID 28202-14) Covers the use and application of various types of reinforced masonry elements, such as rebars and bond beam lintels.

Residential Masonry (25 Hours)
Trainee: $20  Instructor: $20
(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.

Residential Plans and Drawing Interpretation (12.5 Hours)
Trainee: $20  Instructor: $20
(Module ID 28204-13) 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  Instructor: $20
(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  Instructor: $20
(Module ID 28206-14) Describes materials and techniques used to apply insulation and methods of moisture control as they relate to the mason’s trade. Includes hot- and cold-weather considerations.
Masonry Level 2 (continued)

Construction Inspection and Quality Control
(15 Hours)
Trainee $20
Instructor $20
(Module ID 28207-14) Introduces the quality control requirements for masonry construction. Presents procedures for inspection and testing of masonry materials and finished masonry construction.

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 TextGen software, module exams, PowerPoints®, and performance profile sheets from www.nccer.org.com.

PAPERBACK
ISBN
Trainee Guide: $97
Instructor’s Package: $97
978-0-13-413045-4
978-0-13-414124-4

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

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

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

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

Mason's Math (5 Hours)
Trainee $20
Instructor $20
(Module ID 28306-14) Provides a mathematical overview for performing a variety of calculations. Details types of 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
Instructor $20
(Module ID 28306-14) Covers the techniques needed to produce and read site plans and topographic maps. Describes the use of measuring devices such as tapes, range poles, plumb bobs, total stations, leveling instruments, and field notes. Also discusses the construction of batter boards and how to ensure correct measurements.

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

Fundamentals of Crew Leadership (20 Hours)
Trainee $43
Instructor $43
(Module ID 46101-11; see p. 67)
978-0-13-409855-5
978-0-13-409860-9

To Order Call: 1-800-922-0579 www.nccer.org/bookstore
Installing Fiberglass Pipe Insulation (30 Hours)
(Module ID 19016-16) Describes the characteristics of fiberglas pipe insulation and the characteristics of ASJ jacketing.

Insulating Pipe Fittings, Valves, and Flanges (40 Hours)
(Module ID 19107-16) Explains insulation requirements for fittings, valves, and flanges. Provides tips for professional and economical installation.

Ordering information for Insulating, Level 1, Second Edition:
PAPERBACK                      ISBN
Instructor’s Package: $67  978-0-13-909383-8

L2 INSULATING

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

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)
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)
(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)
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)
(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)
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)
(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)
(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)
(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)
(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)
(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.

CURRICULUM NOTES

L3 INSULATING

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

Steam, Condensate, and Process Water Systems (5 Hours)
(Module ID 19305) Covers the identification of steam and condensate piping and describes steam and process water systems and their components.

Large Boilers, Breaching, Precipitators, and Apparatus (10 Hours)
(Module ID 19306) Describes boilers and related equipment, and their insulation requirements.
**Insulating Level 3 (continued)**

**Refrigeration and Cryogenic Systems (2.5 Hours)**
- Trainee $20
- Instructor $20
  
  (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
- Instructor $20
  
  (Module ID 19308) Describes special-application insulation systems, including low-temperature and prefabricated panels; refractory insulation; soft pads and pre-shaped removable covers; preinsulated systems; sprays, foam, and pour-in-place insulation; fire stops; noise and sound control systems; and cryogenic applications.

**Jacketing Fabrication — Piping and Fittings (40 Hours)**
- Trainee $20
- Instructor $20
  
  (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.

**Blueprints and Specifications (12.5 Hours)**
- Trainee $20
- Instructor $20
  
  (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.

**Basic Layout (20 Hours)**
- Trainee $20
- Instructor $20
  
  (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.

**Oxyfuel Cutting (15 Hours)**
- Trainee $20
- Instructor $20
  
  (Module ID 15106-06) Explains the safety requirements for oxyfuel cutting. Identifies oxyfuel cutting equipment and provides instructions for setting up, lighting, and using the equipment. Describes how to perform straight line cutting, piercing, beveling, washing, and gouging.

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

**Field Sketching (10 Hours)**
- Trainee $20
- Instructor $20
  
  (Module ID 15202-07) Teaches the basic skills needed to make a good field sketch to convey information about how parts should be made or assembled.

**Intermediate Blueprint Reading (20 Hours)**
- Trainee $20
- Instructor $20
  
  (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
- Instructor $20
  
  (Module ID 15204-07) Explains power tools used by millwrights and procedures for using, caring for, and maintaining these tools.

**Jacketing Fabrication – Vessels and Equipment (40 Hours)**
- Trainee $20
- Instructor $20
  
  (Module ID 19311) Covers the identification of vessel and equipment jacketing, along with layout, fabrication, installation procedures, and securements.

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

**L2 MILLWRIGHT LEVEL 2**

**Curriculum Notes**
- 150 Hours
- Revised: 2007, Third Edition

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

**Orientation to the Trade (5 Hours)**
- Trainee $20
- Instructor $20
  
  (Module ID 15204-07) Explains how to select, inspect, and maintain torque multipliers, cable cutters, nut splitters, keyseat rules, zero-to-one micrometers, and various gauges.

**Rigging (20 Hours)**
- Trainee $20
- Instructor $20
  
  (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.

**Jacketing Fabrication – Piping and Fittings (40 Hours)**
- Trainee $20
- Instructor $20
  
  (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
- Instructor $20
  
  (Module ID 19312) Describes the identification and application of common sheet metal tools, discusses fabrication and installation methods, and covers flanging and sealing techniques.
Setting Baseplates and Soleplates (15 Hours)
(Module ID 15207-07) Explains procedures for setting machine baseplates and soleplates, and aligning them with other equipment.

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

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

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

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

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

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

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

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

Installing Fans and Blowers (10 Hours)
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.

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)
(Module ID 15401-08) Describes conveyor systems and their principles of operation.

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

Conventional Alignment (30 Hours)
Instructor $20  ISBN 978-0-13-610481-0  
(Module ID 15403-08) Explains the procedures involved in aligning shafts, first with a straightedge and feeler gauges, then with dial indicators.

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

Troubleshooting and Repairing Pumps (7.5 Hours)
Instructor $20  ISBN 978-0-13-610483-4  
(Module ID 15405-08) Discusses 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)
Instructor $20  ISBN 978-0-13-610484-1  
(Module ID 15406-08) Introduces compressors and the troubleshooting and maintenance procedures associated with compressors.

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

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

Trainee Guide: $97  
Instructor’s Guide: $97  
www.nccer.org/bookstore
Basic Hydraulic Systems (70 Hours)
(Module ID 15411-08) Describes preparation for dial indicator measurements.

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

Troubleshooting and Repairing Gearboxes (20 Hours)
(Module ID 15409-08) Describes principles and types of hydraulic equipment and related safety procedures. Describes applications of hydraulic equipment.

Advanced Blueprint Reading (25 Hours)
Instructor $20 ISBN 978-0-13-610467-4
(Module ID 15504-09) Explains how to use theodolites, optical levels, auto levels, and total stations to place and align equipment.

Preventive and Predictive Maintenance (100 Hours)
(Module ID 15508-09) 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.

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

Reverse Alignment (30 Hours)
(Module ID 15501-09) Describes preparation for dial indicator reverse alignment, and explains the procedures for setting up reverse alignment jigs. Explains graphic and mathematical techniques for aligning equipment, based on reverse dial indicator measurements.

Laser Alignment (25 Hours)
Instructor $20 ISBN 978-0-13-610468-1
(Module ID 15503-09) Using one example system, describes the principles of using laser alignment systems to perform alignments.

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

Optical Alignment (25 Hours)
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.

Mobile Crane Operations

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)
(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 care opportunities and operator requirements.

Basic Principles of Cranes (15 Hours)
Instructor $20 ISBN 978-0-13-610072-0
(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)
(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)
Instructor $20 ISBN 978-0-13-610074-4
(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.
### Mobile Crane Operations Level 1 (continued)

**L2 MOBILE CRANE OPERATIONS**

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<td>(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.</td>
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**Curriculum Notes**
- 145 Hours

**PAPERBACK**
**ISBN 978-0-13-160086-4**
Trainee Guide: $97
Instructor’s Guide: $97
978-0-13-109867-1

**L3 MOBILE CRANE OPERATIONS**

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<td>(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.</td>
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**Curriculum Notes**
- 155 Hours (145 Required; 10 Elective/Optional)

**PAPERBACK**
**ISBN 978-0-13-160086-4**
Trainee Guide: $97
Instructor’s Guide: $97
978-0-13-109870-1

### Operating a Crane (25 Hours)

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

(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.

**Advanced Operational Techniques (20 Hours)**

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<td>Instructor $20</td>
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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. 10 for ordering information.)
- Revised: 1997

PAPERBACK ISBN

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 $20 978-0-13-874249-2
Instructor $20 978-0-13-874256-0
(Module ID 07101) Presents a brief history of the painting trade. Covers career opportunities, from apprenticeship/help to managerial/business-related work. Describes the characteristics of the successful tradesperson, including productivity, appearance, personal hygiene, and dependability.

Safety (10 Hours)  
Trainee $20 978-0-13-874223-2
Instructor $20 978-0-13-874231-7
(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 $20 978-0-13-793142-2
Instructor $20 978-0-13-793159-0
(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 $20 978-0-13-874348-2
Instructor $20 978-0-13-874355-0
(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 $20 978-0-13-874389-5
Instructor $20 978-0-13-874397-0
(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 $20 978-0-13-793167-5
Instructor $20 978-0-13-793175-0
(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 $20 978-0-13-793183-5
Instructor $20 978-0-13-793191-0
(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 $20 978-0-13-793209-2
Instructor $20 978-0-13-793217-7
(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 $20 978-0-13-874462-5
Instructor $20 978-0-13-874470-0
(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.

Chemical Cleaning and Stripping (7.5 Hours)  
Trainee $20 978-0-13-874644-2
Instructor $20 978-0-13-874652-0
(Module ID 07203) Covers 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 $20 978-0-13-874629-2
Instructor $20 978-0-13-874637-7
(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 $20 978-0-13-874785-5
Instructor $20 978-0-13-874793-0
(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 $20 978-0-13-874744-2
Instructor $20 978-0-13-874751-0
(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 $20 978-0-13-874587-5
Instructor $20 978-0-13-874595-0
(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 $20 978-0-13-874686-5
Instructor $20 978-0-13-874694-0
(Module ID 07208) Introduces the composition, uses, and application of clear finishes, including varnishes, lacquers, shellsacs, and urethanes.

Wood Finishing (22.5 Hours)  
Trainee $20 978-0-13-874769-5
Instructor $20 978-0-13-874777-0
(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 $20 978-0-13-874603-2
Instructor $20 978-0-13-874611-7
(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 $20 978-0-13-874660-5
Instructor $20 978-0-13-874678-0
(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.

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Coatings Three (15 Hours)
Trainee $20 ISBN 978-0-13-875105-0
(Module ID 07303) Describes unique properties, safety and health considerations, surface preparation, application, and testing, and inspection of high-performance coatings used primarily to protect substrates for commercial or light industrial applications.

Color and Tinting (10 Hours)
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)
(Module ID 07305) Describes techniques for glazing, antiquing, stippling, motling, gilding, marbling, and graining decorative finishes.

Wallcovering (40 Hours)
(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)
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)
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)
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.
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)
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)
(Module ID 08202-06) Introduces plot plans, structural drawings, elevation drawings, re-bolt drawings, equipment arrangement drawings, P&IDs, isometric drawings, spool sheets, and detail sheets.

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

Excavations (15 Hours)
Instructor $20  ISBN 978-0-13-613615-0
(Module ID 08206-06) Explains how to determine pipe lengths between socket 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.

Standards and Specifications (10 Hours)
(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)
(Module ID 08304-07) Discusses the use of equivalent and conversion tables. Explains how to use right angle trigonometry to calculate take-outs.

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

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

Field Routing and Vessel Trim (15 Hours)
Instructor $20  ISBN 978-0-13-614678-4
(Module ID 08307-07) Explains how to secure the work area and determine field run specifications, load weights for erection equipment, and support needs. Describes how to erect vessel trim.

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

Testing Piping Systems and Equipment (20 Hours)
Instructor $20  ISBN 978-0-13-614681-0
(Module ID 08309-07) Explains how to perform pretests, service flow tests, head pressure tests, hydostatic tests, and steam blow tests.

Pipefitting Level 2

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Pipefitting Level 4 (continued)

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

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

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

Steam Traps (10 Hours)
Trainee $20  
Instructor $20  
(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  
Instructor $20  
(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 desuperheaders. The purpose and function of each type is explained.

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

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

Introduction to Supervisory Roles (7.5 Hours)
Trainee $20  
Instructor $20  
(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.

L1 PIPELAYER

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Curriculum Notes

LEVEL 1

• 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.nccerinc.com.

PAPERBACK
ISBN
Trainee Guide: $67  
Instructor’s Guide: $67  
ISBN 978-0-13-015305-0

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.

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

Cutting Pipe (12.5 Hours)
Trainee $20  
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  
Instructor $20  
(Module ID 24105) Describes methods for joining PVC, ductile iron, and concrete pipe, including O-ring, slip joint, mechanical joints, and restraint joints. Discusses methods for joining pipe to pipe, pipe to appurtenances, and pipe to manhole connections, including transition couplings.

Introduction to Elevations (5 Hours)
Trainee $20  
Instructor $20  
(Module ID 24106) Discusses the use, care, and maintenance of the optical level, transit, and the pipe laser. Contains a brief introduction to elevations as it relates to the setup of these instruments. Describes common causes and solutions to laser problems in the field.

Trench Safety (7.5 Hours)
Trainee $20  
Instructor $20  
ISBN 978-0-13-015321-0  
(Module ID 24107) Discusses soil behavior as it relates to trench failures, including common indicators of an unstable trench. Introduces typical shoring, shielding, and sloping methods. Identifies characteristics that may make a trench a confined space and describes the safety measures needed to work in the trench.

Foundation Stabilization, Bedding, and Dewatering (7.5 Hours)
Trainee $20  
Instructor $20  
ISBN 978-0-13-015312-8  
(Module ID 24108) Discusses methods for preparing the trench for pipe installation, including stabilization, bedding, and initial backfill. Describes effective methods for dewatering a trench and includes a section on troubleshooting dewatering equipment.

Testing Pipe (12.5 Hours)
Trainee $20  
Instructor $20  
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.
Introduction to Plumbing Drawings (17.5 Hours)
(Module ID 02105-12) Introduces different types of plumbing drawings and discusses how to interpret and apply them when laying out and installing plumbing systems. Explains the symbols used in plumbing and mechanical drawings, and reviews isometric, oblique, orthographic, and schematic drawings. Requires trainees to render plumbing drawings and to recognize how code requirements apply to plumbing drawings.

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

Cast-Iron Pipe and Fittings (12.5 Hours)
(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)
(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)
(Module ID 02110-12) Discusses the proper applications of code-approved fixtures in plumbing installations. Reviews the different types of fixtures and the materials used in them. Covers storage, handling, and code requirements.

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

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Installing and Testing DWV Piping (30 Hours)
(Module ID 02206-13) 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 and Testing Water Supply Piping (20 Hours)
(Module ID 02208-13) Covers the installation of basic plumbing fixtures, including bathtubs, shower stalls, lavatories, sinks, water closets, and urinals. Reviews the installation of associated valves, faucets, and components. Explains how to connect appliances such as dishwashers, food-waste disposers, refrigerators and ice makers, and washing machines.

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

Installing Water Heaters (10 Hours)
(Module ID 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.

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

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

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

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

Compressed Air (10 Hours)
(Module ID 02339-14) The principles of compressed air systems and describes their components and accessories. Reviews installation and periodic servicing of air compressor systems.

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

Types of Valves (5 Hours)
(Module ID 02220-13) Reviews types of valves, their components, and applications. Also covers valve servicing.

Sizing and Protecting the Water Supply System (30 Hours)
(Module ID 02212-14) Teaches techniques for sizing water supply systems, including calculating system requirements and demand, developed lengths, and pressure drops. Reviews the factors that can reduce efficiency of water supply piping. Introduces different backflow prevention devices and explains how they work, where they are used, and how they are installed in water supply systems.

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

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

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

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Fundamentals of Crew Leadership (20 Hours)
(Module ID 46101-11; see p. 69)
Trainee $43
Instructor $43
Water Pressure Booster and Recirculation Systems (12.5 Hours)
Trainee $20
Instructor $20
(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
Instructor $20
(Module ID 02404-14) Describes the code requirements and installation procedures for systems that protect against contamination from indirect and special waste.
Hydronic and Solar Heating Systems (17.5 Hours)
Trainee $20
Instructor $20
(Module ID 02405-14) Introduces the basic types of hydronic and solar heating systems and their components. Reviews hydronic and solar heating system layout, installation, testing, and balancing, and also discusses methods that inhibit corrosion in hydronic or solar heating systems.

Codes (12.5 Hours)
Trainee $20
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
Instructor $20
(Module ID 02408-14) Describes the operation of pumps and well components. Reviews the qualities of good wells and how to assemble and disassemble pumps and components.
Private Waste-Disposal Systems (10 Hours)
Trainee $20
Instructor $20
(Module ID 02409-14) Describes the types of private waste-disposal systems, discusses the maintenance and installation of these systems, and explains how to determine the local code requirements for these systems. Covers percolation tests and sewage system planning and layout.

Concreting Reinforcement Safety (15 Hours)
Trainee $20
Instructor $20
(Module ID 39102-05) Focuses on safety topics of particular concern to the reinforcing ironworker, including rebar-related hazards, fall protection, use of positioning devices, PPE, excavations, and lifting/carrying techniques.
Rigging Equipment (10 Hours)
Trainee $20
Instructor $20
ISBN 978-0-13-228989-4
(Module ID 39103-05) Describes the use and inspection of basic equipment and hardware used in rigging, including slings, wire rope, chains, and attaching hardware such as shackles, eyebolts, and hooks, as well as rigging knots.

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

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

Swimming Pools and Hot Tubs (7.5 Hours)
Trainee $20
Instructor $20
(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
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
Instructor $20
(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.

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## Reinforcing Ironwork Level 2 (continued)

**Foundations and Flatwork** (15 Hours)
- **Trainee**: $20  
- **Instructor**: $20  
  (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. Farming terms, parts of forms and procedures for constructing basic footing and edge forms are included.

**Concrete Forms** (32.5 Hours)
- **Trainee**: $20  
- **Instructor**: $20  
  (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  
- **Instructor**: $20  
  (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  
- **Instructor**: $20  
  (Module ID 27208-01) Covers the types of manufactured forms and form hardware systems used in the construction of walls, columns, deck and roof slabs, beams and girders, culverts, and highways. Includes information on flying forms, slipforms,anchoring, and architectural finishes.

**Metal Decking** (10 Hours)
- **Trainee**: $20  
- **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  
- **Instructor**: $40  
  (Module ID MT101) Teaches leadership skills required to supervise personnel. Discusses principles of project planning, scheduling, estimating, and management. Presents several case studies for student participation.

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### Rigger/Signal Person

**Basic Rigging** (15 Hours)
- **Trainee**: $49  
- **Instructor**: $49  
  (Module ID 00106-09; from Core Curriculum)
  - **40 Hours**
  - **Revised**: 2011, Second Edition
  - A Spanish translation of Rigging Fundamentals is available. Please see NCCER’s online catalog for more information.

**Intermediate Rigging** (10 Hours)
- **Trainee**: $49  
- **Instructor**: $49  
  (Module ID 27201-01)

**Advanced Rigging** (20 Hours)
- **Trainee**: $49  
- **Instructor**: $49  

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### Modules

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

- **Basic Rigging** (15 Hours)
  - **Trainee**: $20  
  - **Instructor**: $20  
    ISBN 978-0-13-266200-0
  (Module ID 38201-01)

- **Rigging Equipment** (10 Hours)
  - **Trainee**: $20  
  - **Instructor**: $20  
  (Module ID 38201-11)

- **Wire Rope** (10 Hours)
  - **Trainee**: $20  
  - **Instructor**: $20  
  (Module ID 38202-11)

- **Boom Assembly and Disassembly** (20 Hours)
  - **Trainee**: $20  
  - **Instructor**: $20  
  (Module ID 38203-11)

- **Basic Principles of Cranes** (15 Hours)
  - **Trainee**: $20  
  - **Instructor**: $20  
  (Module ID 38204-11)

- **Advanced Rigging** (20 Hours)
  - **Trainee**: $20  
  - **Instructor**: $20  
  (Module ID 38205-11)

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### Curriculum Notes

- **BASIC RIGGER**
  - 40 Hours
  - Revised: 2011, Second Edition
  - A Spanish translation of Rigging Fundamentals is available. Please see NCCER’s online catalog for more information.

- **INTERMEDIATE RIGGER**
  - 55 Hours
  - Published: 2011

- **ADVANCED RIGGER**
  - 65 Hours
  - Published: 2011
SIGNAL PERSON

- 40 Hours
- Published: 2011
- Instructor’s Guide includes access code to download TestGen software, module exams, PowerPoint®s, and performance profile sheets from www.nccerirc.com.

PAPERBACK               ISBN
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
Instructor $20
(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
Instructor $20
(module ID 21104-04; from Mobile Crane Operations Level One)
Trainee $20
Instructor $20

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.)
- 10 Hours
- 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, PowerPoint®s, 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        978-0-13-378081-1
Instructor’s Package: $67  978-0-13-416731-2

SIGNAL PERSON

- 40 Hours
- Published: 2011
- Instructor’s Guide includes access code to download TestGen software, module exams, PowerPoint®s, and performance profile sheets from www.nccerirc.com.

PAPERBACK               ISBN
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.

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

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

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

Trade Math (7.5 Hours)
Trainee $20
Instructor $20
(module ID 31104-15) Explains and gives examples of math calculations of scaffold loads, including area loads, concentrated loads, live loads, cantilevered loads, and wind loads.

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

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

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

NCCEC 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 NCCEC-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.

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.)
- NATE-Recognized Training Provider

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 Sheet Metal Trade (5 Hours)

Trainee $20
Instructor $20
(Module ID 04101-08) Summarizes the history and development of the sheet metal trade. Explains the benefits of apprenticeship training, and identifies career opportunities in the trade.

Tools of the Trade (5 Hours)

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

Introduction to Sheet Metal Layout and Processes (7.5 Hours)

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

Trade Math One (20 Hours)

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

Fabrication One – Parallel Line Development (22.5 Hours)

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

Installation of Air Distribution Accessories (5 Hours)

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

Insulation (7.5 Hours)

Trainee $20
Instructor $20
(Module ID 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
Instructor $20
ISBN 978-0-13-604877-0
(Module ID 04109-08) Teaches how to lay out and fabricate sheet metal components of a roof drainage system, including flashings, gutters, and downspouts.

Trade Math Two (20 Hours)

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

Plans and Specifications (20 Hours)

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

Fabrication Two – Radial Line Development (55 Hours)

Trainee $20
Instructor $20
(Module ID 04203-08) Introduces radial line development principles used to determine layouts for sheet metal fittings. Includes practice layout and fabrication tasks that allow trainees to develop and demonstrate their skills.

Sheet Metal Duct Fabrication Standards (7.5 Hours)

Trainee $20
Instructor $20
(Module ID 04204-08) Explains how to determine the requirements for a duct system, including operating pressures, metal gauges, connectors, reinforcements, tie rods, and seams. Also reviews how to use standards, codes, and ordinances to design a duct system.

Air Properties and Distribution (15 Hours)

Trainee $20
Instructor $20
(Module ID 04205-08) Explains the properties of air and how these properties relate to one another. Teaches how to use the gas laws, psychrometric charts, and measuring instruments to evaluate air properties in an air distribution system.

Bend Allowances (5 Hours)

Trainee $20
Instructor $20
(Module ID 04206-08) Provides instruction and practice in determining proper bend allowances in sheet metal. Also reviews the interplay of different factors that affect the amount of bend allowance needed and the methods for calculating allowance.

Soldering (15 Hours)

Trainee $20
Instructor $20
(Module ID 04207-08) Identifies soldering tools, materials, and techniques. Also provides a wide range of soldering tasks for practice.
Sheet Metal Level 2 (continued)

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

L3 SHEET METAL

Curriculum Notes
• 157.5 Hours
• Revised: 2009, Third Edition
• NATE-Recognized Training Provider
• Instructor's Guide includes access code to download TestGen software, module exams, PowerPoint®, and performance profile sheets from www.nccerirc.com.

PAPERBACK                ISBN
Trainee Guide: $97  978-0-13-609962-8

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.

Trade Math Three – Field Measuring and Fitting (15 Hours)
(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)
(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)
(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.

Louvres, Dampers, and Access Doors (20 Hours)
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)
(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)
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)
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

Curriculum Notes
• 150 Hours
• Revised: 2009, Third Edition
• NATE-Recognized Training Provider
• Instructor’s Guide includes access code to download TestGen software, module exams, PowerPoint®, and performance profile sheets from www.nccerirc.com.

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

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

Fume and Exhaust System Design (25 Hours)
(Module ID 04404-09) Reviews the codes and specifications pertaining to fume and exhaust system design for safe 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)
(Module ID 04405-09) Provides a review of parallel line, radial line, and triangulation development methods for laying out sheet metal parts. Trainees practice laying out and fabricating selected sheet metal fittings using these methods.

Introductory Supervisory Skills (20 Hours)
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.
Survey Equipment Use and Care One (30 Hours)
(Module ID 78103-04) Covers the use and care of tools and instruments commonly used to perform site survey work. Introduces the instruments and procedures used for making distance measurements electronically and for performing differential leveling and basic horizontal and vertical angular measurements. Includes guidelines for recording surveying measurement data in field notes.

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

Survey Equipment Use and Care Two, EDMs and Total Stations (10 Hours)
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)
(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)
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 plots and site plans to identify rights-of-way, utilities, setbacks, boundaries, and tie-in locations.

Data Collection and Basic Computer Skills (10 Hours)
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)
(Module ID 78206-04) Covers the chemical and physical properties of concrete and the components, such as cement, aggregates, and admixtures, that make up the concrete mixture. Explains the various methods and equipment used to sample, test, and inspect concrete.

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

**L1 SPRINKLER FITTING**

**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

**MODULES**

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

**Orientation to the Trade** (5 Hours)
- Trainee: $20
- Instructor: $20

**Introduction to Components and Systems** (7.5 Hours)
- Trainee: $20
- ISBN: 978-0-13-378240-0
- Instructor: $20

**Steel Pipe** (22.5 Hours)
- Trainee: $20
- Instructor: $20

**CPVC Pipe and Fittings** (10 Hours)
- Trainee: $20
- Instructor: $20

**Copper Tube Systems** (10 Hours)
- Trainee: $20
- Instructor: $20

**Underground Pipe** (17.5 Hours)
- Trainee: $20
- Instructor: $20

**General Purpose Valves** (15 Hours)
- Trainee: $20
- Instructor: $20

**General Trade Math** (20 Hours)
- Trainee: $20
- Instructor: $20

**Sprinkler Fitting**

**L2 SPRINKLER FITTING**

**Curriculum Notes**
- 152.5 Hours
- Revised: 2013, Third Edition to reflect NFPA 13

**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
- Instructor: $20

**General Purpose Valves** (15 Hours)
- Trainee: $20
- Instructor: $20

**General Trade Math** (20 Hours)
- Trainee: $20
- Instructor: $20

**Sprinkler Fitting**

**L3 SPRINKLER FITTING**

**Curriculum Notes**
- 147.5 Hours
- Revised: 2013, Third Edition to reflect NFPA 13

**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.

**Dry-Pipe Systems** (25 Hours)
- Trainee: $20
- Instructor: $20

**Deluge/Preaction Systems** (40 Hours)
- Trainee: $20
- Instructor: $20

**Sprinkler Fitting**
Sprinkler Fitting Level 3 (continued)

**Standpipes** (25 Hours)
- Trainee $20
- Instructor $20
  - Module ID 18302-13: Describes standpipe classifications and explains flow capabilities of each type. Covers requirements for sizing and installation of standpipes. Discusses pressure-reducing valves under flow and no-flow conditions. Also covers LINK-SEAL™ installations.

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

**Fire Pumps** (40 Hours)
- Trainee $20
- Instructor $20
  - Module ID 18304-13: Covers fire pump categories and components. Describes fire pump controller requirements and fire pump performance and alignment. Explains pump and driver characteristics and performance curves as well as controllers, sensing lines, supervision, and starting methods. Outlines project requirements, installation, maintenance, and troubleshooting.

**Application-Specific Sprinklers and Nozzles** (27.5 Hours)
- Trainee $20
- Instructor $20
  - Module ID 18305-13: Describes application-specific sprinkler types and requirements. Discusses area of coverage, positioning, and obstruction requirements and explains system selection.

**Inspection, Testing, and Maintenance** (17.5 Hours)
- Trainee $20
- Instructor $20
  - Module ID 18404-13: Introduces the role of foremanship and covers responsibilities, leadership, and safety. Also explains project documentation and reports related to materials tracking and labor tracking.

**Introductory Skills for the Foreman** (20 Hours)
- Trainee $20
- Instructor $20
  - Module ID 18405-13: Explains the importance of proper documentation to ensure correct installation and avoid future rework and possible unintentional releases. Emphasizes the need to properly document the actual installation using written reports and photographs. Includes causes of and responses to water damage, and provides a case history of an unintentional release.

**Procedures and Documentation** (20 Hours)
- Trainee $20
- Instructor $20
  - Module ID 18406-13: Explains the importance of proper documentation to ensure correct installation and avoid future rework and possible unintentional releases. Emphasizes the need to properly document the actual installation using written reports and photographs. Includes causes of and responses to water damage, and provides a case history of an unintentional release.

**Special Extinguishing Systems** (42.5 Hours)
- Trainee $20
- Instructor $20
  - Module ID 18403-13: Identifies the following extinguishing exposure systems: water spray, foam, carbon dioxide, Halon, auxiliary and local alarm. Limited water systems, fire extinguishers, and water mist suppression systems are also covered.

**Tower Crane Operator**

**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
- Instructor $20
  - Module ID 18401-13: Identifies basic hydraulic concepts and selection of hydraulic design methods. System configuration, design criteria, discharge characteristics, and types of pressure loss are explained. Explains how to perform fire sprinkler system hydraulic calculations.

**Standpipes** (42.5 Hours)
- Trainee $20
- Instructor $20
  - Module ID 18403-13: Identifies the following extinguishing exposure systems: water spray, foam, carbon dioxide, Halon, auxiliary and local alarm. Limited water systems, fire extinguishers, and water mist suppression systems are also covered.
Tower Crane Operator (continued)

Communications  (10 Hours)
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)
(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.

Welding

Weld Quality  (10 Hours)
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)
(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)
(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)
(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)
(Module ID 29110-15) Describes job code specifications. Explains how to use fit-up gauges and measuring devices to check fit-up and alignment and use plate and pipe fit-up and alignment tools to properly prepare joints. Explains how to check for joint misalignment and poor fit.

SMAW – Groove Welds with Backing  (50 Hours)
(Module ID 29111-15) Describes 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.

Welding Safety  (5 Hours)
(Module ID 29101-15) Covers safety equipment, protective clothing, and procedures applicable to the cutting and welding of metals.

Oxyfuel Cutting  (17.5 Hours)
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, beveling, washing, and gouging.

Plasma Arc Cutting  (7.5 Hours)
(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)
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 welding and gouging activities.

Base Metal Preparation  (12.5 Hours)
(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.

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

To Order Call: 1-800-922-0579
Stay Connected:  www.nccer.org/bookstore
SMAW — Open-Root Groove Welds — Plate (60 Hours)
(Module ID 292112-15) Introduces various types of groove welds and describes how to prepare for groove welding. Describes the techniques required to produce various open V-groove welds.

L2 WELDING

Curriculum Notes
• 227.5 Hours
• Revised: 2015, Fifth Edition
• Seeded 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 E62.0:2008 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.nccerccrc.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, our complete online solution, is available. 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 Package. The following ISBN and pricing information is for ordering individual modules only.

SMAW — Open-Root Groove Welds — Plate (60 Hours)
(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)
(Module ID 29202-15) Identifies and explains welding detail drawings. Describes lines, fills, object views, and dimensioning on drawings. Explains how to use notes on drawings and the bill of materials. Explains how to sketch and draw basic welding drawings.

Physical Characteristics and Mechanical Properties of Metals (7.5 Hours)
(Module ID 29203-15) Explains physical characteristics, mechanical properties, composition, and classification of common ferrous and nonferrous metals. Identifies the various standard metal forms and structural shapes. Shows how to extract metal information from Welding Procedure Specification (WPS) sheets and Procedure Qualification Records (PQRs). Covers visual inspection, magnetic testing, and X-ray fluorescent spectrometry methods used to identify metals.

Preheating and Postheating of Metals (5 Hours)
(Module ID 29204-15) Explains preheating, interpass temperature control, and postheating procedures that sometimes need to be done to preserve weldment strength, ductility, and weld quality. Covers the equipment used for heat treating metals.

GMAW and FCAW — Equipment and Filler Metals (10 Hours)
(Module ID 29205-15) Describes general safety procedures for GMAW and FCAW. Identifies GMAW and FCAW equipment and explains the filler metals and shielding gases used to perform GMAW and FCAW. Explains how to set up and use GMAW and FCAW equipment and how to clean GMAW and FCAW welds.

GMAW — Plate (60 Hours)
(Module ID 29209-15) Explains how to set up and use GMAW equipment and how to select and use different filler metals and shielding gases. Describes how to make multiple-pass fillet and V-groove welds on carbon steel plate in various positions.

FCAW — Plate (60 Hours)
(Module ID 29210-15) Explains how to set up and use FCAW equipment and how to select and use different filler metals and shielding gases. Describes how to make multiple-pass fillet and V-groove welds on carbon steel plate in various positions.

GTAW — Equipment and Filler Metals (10 Hours)
(Module ID 29207-15) Explains GTAW safety. Identifies and explains the use of GTAW equipment, filler metals, and shielding gases. Covers the setup of GTAW equipment.

GTAW — Plate (60 Hours)
(Module ID 29208-15) Describes how to build pads on carbon steel plate using GTAW and carbon steel filler metal. Also explains how to make multiple-pass GTAW fillet welds on carbon steel plate coupons in the 1F, 2F, 3F, and 4F positions, and how to make GTAW V-groove welds in the 1G, 2G, 3G, and 4G positions.

GTAW — Carbon Steel Pipe (80 Hours)
(Module ID 29304-16) Explains how to set up GTAW equipment for open-root V-groove welds, and explains how to prepare for and make open-root V-groove welds on carbon steel pipe. Provides procedures for making open-root V-groove welds with GTAW equipment on pipe in the 1G-ROTATED, 2G, 3G, and 6G positions.

GMAW — Pipe (60 Hours)
Instructor $20  ISBN 978-0-13-448565-4
(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, 3G, and 6G positions.

FCAW — Pipe (60 Hours)
(Module ID 29301-16) 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, 3G, and 6G positions.

SMAW — Open-Root Pipe Welds (100 Hours)
Instructor $20  ISBN 978-0-13-448561-4
(Module ID 29303-16) 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, 3G, and 6G positions.

SMAW – Pipe (60 Hours)
Instructor $20  ISBN 978-0-13-448565-4
(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, 3G, and 6G positions.

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Welding Level 3 (continued)

GTAW – Low Alloy and Stainless Steel Pipe
(70 Hours)
Instructor $20 ISBN 978-0-13-448569-0
(Module ID 29305-16) Explains how to set up GTAW equipment for open-root V-groove welds on low-alloy and stainless steel pipe, and 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)
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.

Ordering information for Welding, Level 3, Fourth Edition:
PAPERBACK ISBN
Instructor’s Package: $97 978-0-13-213512-2

ADVANCED TOPICS IN WELDING: ALUMINUM

Curriculum Notes
• 160 Hours
• Revised: 2010, Fourth Edition
• Instructor’s Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com.
• A revision is under way and will be in stock in 2016; for more information visit www.nccer.org/book-updates.

PAPERBACK ISBN

GTAW – Aluminum Plate (30 Hours)
(Module ID 29402-10) 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)
Instructor $20 ISBN 978-0-13-213785-0
(Module ID 29403-10) 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 Plate (30 Hours)
(Module ID 29401-10) 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 welding. 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.

GMAW – Aluminum Pipe (50 Hours)
Instructor $20 ISBN 978-0-13-213787-4
(Module ID 29404-10) Covers the setup of GMAW equipment for welding aluminum plate. 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.
### Alternative Energy

**Curriculum Notes**
- Introduction to the Power Industry is a prerequisite for completion and must be purchased separately. See p. 84 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 as 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.

### 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
- **Instructor** $20

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**Introduction to Alternative Energy**

#### Description

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
- **Instructor** $20

**Module ID 74102-11**


**Module ID 74102-11**


**Description**

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.

### Solar Photovoltaics

**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.
- 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.

### 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** $20
- **Instructor** $20

<table>
<thead>
<tr>
<th>Module ID</th>
<th>ISBN</th>
<th>Price</th>
</tr>
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<tbody>
<tr>
<td>57101-10</td>
<td>978-0-13-213726-3</td>
<td>Trainee $20, Instructor $20</td>
</tr>
<tr>
<td>57101-10</td>
<td>978-0-13-213727-0</td>
<td>Trainee $20, Instructor $20</td>
</tr>
</tbody>
</table>

**Introduction to Solar Photovoltaics**

#### Description

Covers the basic concepts of PV systems and their components, along with general sizing and electrical/mechanical design requirements. Provides an overview of performance analysis and troubleshooting. Successful completion of this module will help prepare trainees for the North American Board of Certified Energy Practitioners (NABCEP) PV Entry Level Exam.

### Site Assessment (10 Hours)
- **Trainee** $20
- **Instructor** $20

<table>
<thead>
<tr>
<th>Module ID</th>
<th>ISBN</th>
<th>Price</th>
</tr>
</thead>
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<tr>
<td>57102-11</td>
<td>978-0-13-266202-4</td>
<td>Trainee $20, Instructor $20</td>
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<tr>
<td>57102-11</td>
<td>978-0-13-266207-9</td>
<td>Trainee $20, Instructor $20</td>
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</tbody>
</table>

**Site Assessment**

#### Description

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
- **Instructor** $20

<table>
<thead>
<tr>
<th>Module ID</th>
<th>ISBN</th>
<th>Price</th>
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<tr>
<td>57103-11</td>
<td>978-0-13-266203-1</td>
<td>Trainee $20, Instructor $20</td>
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<tr>
<td>57103-11</td>
<td>978-0-13-266208-6</td>
<td>Trainee $20, Instructor $20</td>
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**System Design**

#### Description

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
- **Instructor** $20

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<tr>
<th>Module ID</th>
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<th>Price</th>
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<tr>
<td>74104-11</td>
<td>978-0-13-272938-3</td>
<td>Trainee $20, Instructor $20</td>
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<tr>
<td>74104-11</td>
<td>978-0-13-272943-7</td>
<td>Trainee $20, Instructor $20</td>
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**Wind Power**

#### Description

Describes wind power and how it is harnessed. Identifies advantages and disadvantages of wind energy. Discusses the past, present, and future of wind energy, as well as wind energy applications.
Sustainable Construction

Sustainable Construction Supervisor


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.

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

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.

Weatherization

As energy efficiency is becoming a priority for homeowners across America, many are turning to the weatherization industry to assist in their efforts. NCCER’s Weatherization program offers training that exceeds the existing standards for weatherization technicians, crew chiefs, and building auditors. This program combines existing NCCER curricula with new building science modules that address the specific needs of this industry. Dual credentials are available within this program. Note: Instructors wishing to teach NCCER’s Weatherization program must meet specific qualifications. For more information, contact NCCER Customer Service at 1-888-622-3720.

Introduction to Weatherization

Introduces the purpose and benefits of the weatherization program. Explains how weatherization goals are met by reducing heating and cooling losses and how infiltration points are located. Approved for 17.5 continuing education hours under GBCI’s credential maintenance program.

Weatherization (continued)

FUNDAMENTALS OF WEATHERIZATION

- 90 Hours
- Published: 2010
- Introduction to Weatherization, combined with NCCER’s Core Curriculum, makes up Fundamentals of Weatherization and is intended to introduce trainees to the concepts and skills they will need to successfully complete Weatherization Technician Level One. See page 10 for detailed contents of Core Curriculum.

PAPERBACK ISBN
Trainee Guide: $67 978-0-13-237659-4
Instructor’s Guide: $67 978-0-13-237661-7

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

PAPERBACK ISBN

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

Wood and Masonry Construction Methods (12.5 Hours)
(Module ID 33102-10; from EST Level One)
Instructor S20 ISBN 978-0-13-257039-8

Thermal & Moisture Protection (7.5 Hours)
(Module ID 27203-07; from Carpentry Level Two)
Trainee S20 ISBN 978-0-13-257040-4
Instructor S20 ISBN 978-0-13-257041-1

Sealing the Building Envelope (25 Hours)
(Module ID 59102-10) 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)
(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

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 S20 ISBN 978-0-13-266284-0
Instructor S20 ISBN 978-0-13-266295-6

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

Introduction to Supervisory Skills (15 Hours)
(Module ID 03410-09; from HVAC Level Four)
Trainee S20 ISBN 978-0-13-266286-4

Introduction to Cooling (30 Hours)
(Module ID 03107-07; from HVAC Level One)
Instructor S20 ISBN 978-0-13-266299-4

Introduction to Heating (15 Hours)
(Module ID 03108-07; from HVAC Level One)
Instructor S20 ISBN 978-0-13-266300-7

Chimneys, Vents, and Flues (5 Hours)
(Module ID 03202-07; from HVAC Level Two)
Instructor S20 ISBN 978-0-13-266303-8

Air Distribution Systems (10 Hours)
(Module ID 03109-07; from HVAC Level One)
Instructor S20 ISBN 978-0-13-266302-1

Air Quality Equipment (5 Hours)
(Module ID 03204-07; from HVAC Level Two)
Trainee S20 ISBN 978-0-13-266314-4

Indoor Air Quality (15 Hours)
(Module ID 03403-09; from HVAC Level Four)
Weatherization Level 2 (continued)

**Diagnostics and Management Practices**  
(30 Hours)  
Trainee $20  
Instructor $20  
(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.

**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  
Instructor $20  

**Introduction to Cooling**  
(30 Hours)  
(Module ID 03107-07; from HVAC Level One)  
Trainee $20  
Instructor $20  

**Introduction to Heating**  
(15 Hours)  
(Module ID 03108-07; from HVAC Level One)  
Trainee $20  
Instructor $20  

**Chimneys, Vents, and Flues**  
(5 Hours)  
(Module ID 03202-07; from HVAC Level Two)  
Trainee $20  
Instructor $20  

**Introduction to Hydronic Systems**  
(10 Hours)  
(Module ID 03203-07; from HVAC Level Two)  
Trainee $20  
Instructor $20  
(ISBN 978-0-13-266312-0)  

**Heating and Cooling System Design**  
(25 Hours)  
(Module ID 03407-09; from HVAC Level Four)  
Trainee $20  
Instructor $20  

**Energy Conservation Equipment**  
(10 Hours)  
(Module ID 03404-09; from HVAC Level Four)  
Trainee $20  
Instructor $20  

**Indoor Air Quality**  
(15 Hours)  
(Module ID 03403-09; from HVAC Level Four)  
Trainee $20  
Instructor $20  

**Alternative Heating and Cooling Systems**  
(10 Hours)  
(Module ID 03409-09; from HVAC Level Four)  
Trainee $20  
Instructor $20  

**Performing a Building Audit**  
(42.5 Hours)  
(Module ID 59202-10) Explains how to interview homeowners and educate them about saving energy in their homes. Explains how to inspect and evaluate the building envelope and HVAC systems. Describes how to perform the following tests: blower door, pressure pan, burner efficiency, carbon monoxide, draft, and spillage. Also covers lead-safe work practices, baseload energy use, and the purpose of the forms and reports a building auditor is responsible for completing.

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**Wind Energy**

**L1 WIND TURBINE MAINTENANCE TECHNICIAN**  
LEVEL 1  
**VOLUME 1**  
Trainee Guide: $32.50  
Instructor’s Guide: $32.50  

**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. 84 for ordering information.)
- Volume 2: 110 Hours
- Published: 2011
- Instructor’s Guide includes access code to download TestGen software, module exams, PowerPoint®s, 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.

**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 $20  
Instructor $20  

**Introduction to Turbine Safety**  
(12.5 Hours)  
Trainee $20  
Instructor $20  

**Climbing Wind Towers**  
(40 Hours)  
(Module ID 58103-11) Covers all aspects of climbing wind turbine lattice towers and tubular towers. Discusses proper climbing equipment and equipment inspection, environmental hazards, proper climbing techniques, and common wind turbine safe climbing guidelines.

**Introduction to Electrical Circuits**  
(7.5 Hours)  
(Module ID 26103-11; from Electrical Level One)  
Trainee $20  
Instructor $20  

**Electrical Theory**  
(7.5 Hours)  
(Module ID 26104-11; from Electrical Level One)  
Trainee $20  
Instructor $20  
(ISBN 978-0-13-257811-0)  

**Electrical Test Equipment**  
(5 Hours)  
(Module ID 26112-11; from Electrical Level One)  
Trainee $20  
Instructor $20  
Wind Energy (continued)

**Electrical Wiring** (10 Hours)
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)

**Circuit Breakers and Fuses** (10 Hours)
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)
(Module ID 58106-11) Provides coverage of switching devices related to the power distribution and control of wind turbines. Mechanical and solid-state relay types are presented, as well as typical wind turbine control wiring diagrams. Explains various time delay schemes and how they can be applied.

**Wind Turbine Power Distribution Systems** (12.5 Hours)
(Module ID 58107-11) Discusses the basics of power generation and the generators used in wind turbines. Reviews how power is distributed and controlled during various modes of wind turbine operation. Simple one-line diagrams are also covered.

**Fasteners and Torquing** (20 Hours)
(Module ID 58108-11) Presents comprehensive coverage of wind turbine fasteners and their required characteristics. Covers torque theory, torquing, tensioning, and hydraulic torquing equipment. Presents the use and care of all significant torquing and tensioning tools. The use of taps and dies is also introduced.

**Introduction to Bearings** (15 Hours)
(Module ID 32207-07; from Industrial Maintenance Mechanic Level Two)

**Lubrication** (12.5 Hours)
(Module ID 58109-11) Explores basic lubrication theory and related equipment. Includes the different applications and types of lubricants used in the wind turbine environment. Reviews OSHA's hazard communication program and the EPA's hazardous waste control program. Includes in-depth coverage of material safety data sheets.

**Introduction to Hydraulic Systems** (10 Hours)
(Module ID 58110-11) Covers all aspects of common hydraulic systems, including fluids, system components, and pumps. Presents the principles of hydraulic system operation and the related components. Simple hydraulic system maintenance is also introduced.
**Fundamentals of Crew Leadership**

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

**Project Supervision**

**Human Relations and Problem Solving** (20 Hours)
  (Module ID MT202-01) Focuses on the communication process and developing effective communication and leadership skills. Compares problem solving to decision making. Discusses potential human relations difficulties and how to resolve them.

**Safety** (7.5 Hours)
- Participant S20  ISBN 978-0-13-103668-0
  (Module ID MT103-01) Describes the supervisor’s role in job-site safety, the true cost of accidents, and how to train and involve all employees in job safety. Includes OSHA safety inspections.

**Quality Control** (5 Hours)
  (Module ID MT204-01) Defines different types of quality control. Explains how to incorporate quality and safety through effective communication, document control, and inspections.

**Document Control and Estimating** (10 Hours)
- Participant S20  ISBN 978-0-13-103671-0
- Instructor S20  ISBN 978-0-13-103673-4
  (Module ID MT206-01) Provides an introduction to using and maintaining document control. Defines the elements of material, labor, and equipment estimates and how to develop, organize, and look for errors in an estimate.

**Planning and Scheduling** (17.5 Hours)
  (Module ID MT207-01) Introduces stages of planning, how to implement a plan, and how to coordinate with other contractors. Includes planning resources, materials, equipment, tools, and labor. Discusses short- and long-term schedules.

**Resource Control and Cost Awareness** (15 Hours)
- Participant S20  ISBN 978-0-13-103674-1
- Instructor S20  ISBN 978-0-13-103684-0
  (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
- A companion DVD with scenarios and a user’s guide is available for purchase. See “Management DVD” for ordering details.

PAPERBACK

<table>
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<tr>
<th>Product Supplements</th>
<th>ISBN</th>
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<tr>
<td>Instructor’s Guide + Management DVD</td>
<td>978-0-13-610624-1</td>
<td>$95</td>
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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 S20 ISBN 978-0-13-604486-4
- Instructor S20 ISBN 978-0-13-604487-1

(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)
- Instructor S20 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 S20 ISBN 978-0-13-603845-0

(Module ID 44103-08) Discusses the values and expectations of the workforce, building relationships, and satisfying stakeholders. Describes the principles of effective communication, applying the management grid, and using relationship skills to create a leadership environment. Also discusses behavioral interviewing and professional development of personnel.

Issues and Resolutions (15 Hours)
- Participant S20 ISBN 978-0-13-603847-4

(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 S20 ISBN 978-0-13-603848-1
- Instructor S20 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 S20 ISBN 978-0-13-603849-8

(Module ID 44106-08) Discusses the importance of formal job planning and creating a performance-based work environment. Discusses the Work Breakdown Structure (WBS) as the foundation that identifies deliverables, tasks, and time. Introduces the basics of quality control and defines the roles and responsibilities of an effective team and how to allocate resources.

Estimating and Cost Control (15 Hours)
- Instructor S20 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 S20 ISBN 978-0-13-603816-0
- Instructor S20 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)
- Instructor S20 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 S20 ISBN 978-0-13-603818-4

(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 S20 ISBN 978-0-13-603819-1

(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


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

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

**Maritime Industry Fundamentals**

**Introduction to the Maritime Industry**

12.5 Hours  
Published: 2013  
Module ID 84101-13

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<th>PAPERBACK</th>
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<tr>
<td>Trainee Guide: $22</td>
<td>978-0-13-295443-3</td>
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- Instructor’s Guide includes access code to download TestGen software, module exams, PowerPoint® slides, 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 Pipefitting**

**Orientation to the Maritime Pipefitting Trade**  
(5 hours)  
Trainee: S20  
Instructor: S20  
(978-0-13-340590-3)  
(978-0-13-340606-1)

- Either 2009 or 2015 Core can be used for the Maritime Industry Fundamentals package.
- Either these are prerequisites 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.

Procedures for selecting, inspecting, using, and maintaining power tool safety and procedures for threading pipe are provided. Common techniques, such as straight line cutting, beveling, washing, and gouging are reviewed. Oxyfuel gas supply arrangements from both cylinders and manifolds are provided. Common techniques, such as straight line cutting, beveling, washing, and gouging are reviewed. Oxyfuel gas supply arrangements from both cylinders and manifolds are provided.
Maritime Pipefitting Level 2

L2  MARITIME PIPEFITTING

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.

MODULES

PAPERBACK  ISBN
Trainee Guide: $97  978-0-13-340478-4
Instructor’s Guide: $97  978-0-13-340479-1

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.

Piping Systems (5 hours)
(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)
(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)
(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)
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)
(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)
(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)
(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

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. 72 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  978-0-13-294844-7

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)

Oxyfuel Cutting (17.5 Hours)
(Module ID 29102-09; from Welding Level One)
Instructor $20  ISBN 978-0-13-610506-0

Base Metal Preparation (12.5 Hours)
(Module ID 29105-09; from Welding Level One)

Weld Quality (10 Hours)
(Module ID 29106-09; from Welding Level One)

Tack Welding (40 Hours)
(Module ID 86101-14) Describes how to set up welding equipment, strike an arc, and make tack welds in order to maintain proper alignment of parts in anticipation of finish welding. Covers the machines, tools, and techniques used to make tack welds in various positions.

Shielded Metal Arc Welding – Electrodes (2.5 Hours)
(Module ID 29108-09; from Welding Level One)
Instructor $20  ISBN 978-0-13-610548-0

Fire Watch (5 Hours)
(Module ID 86102-14) Prepares a worker to perform fire watch duties in support of welding and flame cutting activities. Describes the classes of fires and the methods used to extinguish them, as well as the responsibilities of a person assigned as a fire watch.

Introduction to Structural Fitter Drawings (10 Hours)
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.

Stay Connected:  www.nccer.org/bookstore

To Order Call:  1-800-922-0579
### Fitting One (40 Hours)

<table>
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(Module ID 86104-14) Introduces layout tools, fitting tools, and fitting aids used to fit up and align plate joints. Incorporates hands-on tasks through which the beginning fitter will learn how to perform basic layout, alignment, and fit-up tasks.

### Fitting Two (140 Hours)

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(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.

### Intermediate Structural Print Reading (40 Hours)

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(Module ID 86202-14) 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.

### GMAW and FCAW – Equipment and Filler Metals (10 Hours)

<table>
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(Module ID 29205-09; from Welding Level Two)

### Fitting Three (80 Hours)

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(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.

### Advanced Structural Print Reading (40 Hours)

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(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.
Abnormal Operating Conditions

Field Abnormal Operating Conditions

- 10 Hours
- Published: 2014
- Module ID 71101-14

Trainee: $20  

Instructor’s Guide: $20  

Instructor’s Res. Access Card: $20  

- New printed Instructor’s Guide for each individual module includes lesson plans, instructor’s copy of Trainee Guide, module exams, and performance profile sheets.
- IRC Instructor’s Access Card sold separately. It provides access to download TestGen software, module exams, lesson plans, Powerpoints®, and performance profiles sheets for all modules from www.nccerirc.com.

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.

Control Center Abnormal Operating Conditions

- 10 Hours
- Published: 2014
- Module ID 71102-14

Trainee: $20  

Instructor’s Guide: $20  

Instructor’s Res. Access Card: $20  

- New printed Instructor’s Guide for each individual module includes lesson plans, instructor’s copy of Trainee Guide, module exams, and performance profile sheets.
- IRC Instructor’s Access Card sold separately. It provides access to download TestGen software, module exams, lesson plans, Powerpoints®, and performance profiles sheets for all modules from www.nccerirc.com.

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.
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.

To Order Call: 1-800-922-0579 www.nccer.org/bookstore
Power Generation Maintenance Electrician Level 2

**MODULES**

**Industrial Safety for E&I Technicians** (12.5 Hours)
- (Module ID 40201-08; from Industrial Maintenance E&I Technician Level Two)
  - Trainee $20
  - Instructor $20

**Managing Electrical Hazards** (12.5 Hours)
- (Module ID 26501-09; from Electrical)
  - Trainee $22
  - Instructor $22

**Introduction to the National Electrical Code** (5 Hours)
- (Module ID 40202-08; from Industrial Maintenance E&I Technician Level Two)
  - Trainee $20
  - Instructor $20

**Electrical Theory** (15 Hours)
- (Module ID 40203-08; from Industrial Maintenance E&I Technician Level Two)
  - Trainee $20
  - Instructor $20

**Alternating Current** (20 Hours)
- (Module ID 40204-08; from Industrial Maintenance E&I Technician Level Two)
  - Trainee $20
  - Instructor $20

**E&I Drawings** (10 Hours)
- (Module ID 40303-09; from Industrial Maintenance E&I Technician Level Three)
  - Trainee $20
  - Instructor $20

**E&I Test Equipment** (10 Hours)
- (Module ID 40205-08; from Industrial Maintenance E&I Technician Level Two)
  - Trainee $20
  - Instructor $20

**Conductors and Cables** (10 Hours)
- (Module ID 40212-08; from Industrial Maintenance E&I Technician Level Two)
  - Trainee $20
  - Instructor $20

**Conductor Terminations and Splices** (10 Hours)
- (Module ID 40213-08; from Industrial Maintenance E&I Technician Level Two)
  - Trainee $20
  - Instructor $20

**Motor Controls** (15 Hours)
- (Module ID 40304-09; from Industrial Maintenance E&I Technician Level Three)
  - Trainee $20
  - Instructor $20

**Hydraulic Controls** (15 Hours)
- (Module ID 40311-09; from Industrial Maintenance E&I Technician Level Three)
  - Trainee $20
  - Instructor $20

**Pneumatic Controls** (15 Hours)
- (Module ID 40312-09; from Industrial Maintenance E&I Technician Level Three)
  - Trainee $20
  - Instructor $20

**Programmable Logic Controllers** (17.5 Hours)
- (Module ID 40409-09; from Industrial Maintenance E&I Technician Level Four)
  - Trainee $20
  - Instructor $20

**Transformer Applications** (7.5 Hours)
- (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
  - Instructor $20

**Machine Bending of Conduit** (15 Hours)
- (Module ID 40310-09; from Industrial Maintenance E&I Technician Level Three)
  - Trainee $20
  - Instructor $20

**Electric Lighting** (15 Hours)
- (Module ID 26203-08; from Electrical Level Two)
  - Trainee $20
  - Instructor $20

**Practical Applications of Lighting** (12.5 Hours)
- (Module ID 26303-08; from Electrical Level Three)
  - Trainee $20
  - Instructor $20

**Circuit Breakers and Fuses** (12.5 Hours)
- (Module ID 26210-08; from Electrical Level Two)
  - Trainee $20
  - Instructor $20

**Transformer Applications** (7.5 Hours)
- (Module ID 40305-09; from Industrial Maintenance E&I Technician Level Three)
  - Trainee $20
  - Instructor $20

**Distribution Equipment** (17.5 Hours)
- (Module ID 40306-09; from Industrial Maintenance E&I Technician Level Three)
  - Trainee $20
  - Instructor $20

**Power Plant Electrical Systems** (12.5 Hours)
- (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
  - Instructor $20

**Motors: Theory and Application** (20 Hours)
- (Module ID 26202-08; from Electrical Level Two)
  - Trainee $20
  - Instructor $20

**Motor-Operated Valves** (15 Hours)
- (Module ID 40313-09; from Industrial Maintenance E&I Technician Level Three)
  - Trainee $20
  - Instructor $20

**Control Systems and Fundamental Concepts** (12.5 Hours)
- (Module ID 26211-08; from Electrical Level Two)
  - Trainee $20
  - Instructor $20

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**Trainee Guide:** $97
- Published: 2010
- 167.5 Hours

**Instructor's Guide:** $97
- Published: 2010
- 167.5 Hours

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**To Order Call:** 1-800-922-0579

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Power Generation Maintenance Technician Level 3 (continued)

Temporary Grounding (15 Hours)
(Module ID 40308-09; from Industrial Maintenance E&I
Technician Level Three)
Trainee $20
Instructor $20
ISBN 978-0-13-604738-4

Module Notes
- 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.

Stay Connected:
Trainee $20
Technical ID 26309-08;
Motor Calculations
Instructor $20

L1 POWER GENERATION 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. 84 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.

To Order Call: 1-800-922-0579 www.nccer.org/bookstore
Power Generation I&C Maintenance Technician Level 1 (continued)

**Valves** (5 Hours)  
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Technician Level One)  
Trainee $20  
Instructor $20  

**Introduction to Test Instruments** (7.5 Hours)  
(Module ID 40110-07; from Industrial Maintenance E&I  
Technician Level One)  
Trainee $20  
Instructor $20  

**Material Handling and Hand Rigging** (15 Hours)  
(Module ID 40311-07; from Industrial Maintenance E&I  
Technician Level One)  
Trainee $20  
Instructor $20  

**Mobile and Support Equipment** (10 Hours)  
(Module ID 40112-07; from Industrial Maintenance E&I  
Technician Level One)  
Trainee $20  
Instructor $20  

**Lubrication** (12.5 Hours)  
(Module ID 40113-07; from Industrial Maintenance E&I  
Technician Level One)  
Trainee $20  
Instructor $20  

**SMAW Equipment and Setup** (5 Hours)  
(Module ID 29107-09; from Welding Level One)  
Trainee $20  
Instructor $20  

L2 **POWER GENERATION I&C MAINTENANCE TECHNICIAN**

**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.

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

**MODES**

**Industrial Safety for E&I Technicians** (12.5 Hours)  
(Module ID 40201-08; from Industrial Maintenance E&I  
Technician Level Two)  
Trainee $20  
Instructor $20  

**Managing Electrical Hazards** (12.5 Hours)  
(Module ID 26501-09; from Electrical)  
Trainee $22  
Instructor $22  

**Introduction to the National Electrical Code®** (5 Hours)  
(Module ID 40202-08; from Industrial Maintenance E&I  
Technician Level Two)  
Trainee $20  
Instructor $20  

**Electrical Theory** (15 Hours)  
(Module ID 40203-08; from Industrial Maintenance E&I  
Technician Level Two)  
Trainee $20  
Instructor $20  

**Alternating Current** (20 Hours)  
(Module ID 40204-08; from Industrial Maintenance E&I  
Technician Level Two)  
Trainee $20  
Instructor $20  

**E&I Drawings** (10 Hours)  
(Module ID 40303-09; from Industrial Maintenance E&I  
Technician Level Three)  
Trainee $20  
Instructor $20  

**E&I Test Equipment** (10 Hours)  
(Module ID 40205-08; from Industrial Maintenance E&I  
Technician Level Two)  
Trainee $20  
Instructor $20  

**Conductors and Cables** (10 Hours)  
(Module ID 40212-08; from Industrial Maintenance E&I  
Technician Level Two)  
Trainee $20  
Instructor $20  

**Conductor Terminations and Splices** (10 Hours)  
(Module ID 40213-08; from Industrial Maintenance E&I  
Technician Level Two)  
Trainee $20  
Instructor $20  

**Hydraulic Controls** (15 Hours)  
(Module ID 40304-09; from Industrial Maintenance E&I  
Technician Level Three)  
Trainee $20  
Instructor $20  

**Electrical Systems for Instrumentation** (22.5 Hours)  
(Module ID 12104-01; from Instrumentation Level One)  
Trainee $20  
Instructor $20  

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

**Switches and Photovoltaic Devices** (5 Hours)  
(Module ID 40209-08; from Industrial Maintenance E&I  
Technician Level Two)  
Trainee $20  
Instructor $20  
ISBN 978-0-13-604710-0  

**Tubing** (15 Hours)  
(Module ID 40211-08; from Industrial Maintenance E&I  
Technician Level Two)  
Trainee $20  
Instructor $20  

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**L3 POWER GENERATION I&C MAINTENANCE TECHNICIAN**

**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.

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

**MODES**

**Instrumentation Electrical Circuity** (25 Hours)  
(Module ID 12305-03; from Instrumentation Level Three)  
Trainee $20  
Instructor $20  

**Process Mathematics** (15 Hours)  
(Module ID 40207-08; from Industrial Maintenance E&I  
Technician Level Two)  
Trainee $20  
Instructor $20  

**Flow, Pressure, Level and Temperature** (15 Hours)  
(Module ID 40206-08; from Industrial Maintenance E&I  
Technician Level Two)  
Trainee $20  
Instructor $20  

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

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**To Order Call**: 1-800-922-0579  
**www.nccer.org/bookstore**
Power Generation I&C Maintenance Technician Level 3 (continued)


Calibrate Supervisory Instrumentation Elements (70 Hours) (Module ID S1401-10) 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.


Preventive and Predictive Maintenance (10 Hours) (Module ID 51402-10) Covers the control devices, methods, and strategies used for boilers and Heat Recovery Steam Generators (HRSGs). Discusses fuel, air, oxygen, feedwater, and steam control, as well as the precautions and regulations related to burner and furnace fuel control.


To Order Call: 1-800-922-0579 Stay Connected: www.nccer.org/bookstore
Power Generation Maintenance Mechanic

**L1 POWER GENERATION MAINTENANCE MECHANIC**

**MODULES**

- **Tools of the Trade** (5 Hours)
  - (Module ID 32102-07; from Industrial Maintenance Mechanic Level One)
  - Trainee $20
  - Instructor $20

- **Fasteners and Anchors** (5 Hours)
  - (Module ID 32103-07; from Industrial Maintenance Mechanic Level One)
  - Trainee $20
  - Instructor $20

- **Gaskets and Packing** (10 Hours)
  - (Module ID 32105-07; from Industrial Maintenance Mechanic Level One)
  - Trainee $20
  - Instructor $20

- **Craft-Related Mathematics** (15 Hours)
  - (Module ID 32106-07; from Industrial Maintenance Mechanic Level One)
  - Trainee $20
  - 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
  - Instructor $20

- **Pumps and Drivers** (5 Hours)
  - (Module ID 32108-07; from Industrial Maintenance Mechanic Level One)
  - Trainee $20
  - Instructor $20

- **Valves** (5 Hours)
  - (Module ID 32109-07; from Industrial Maintenance Mechanic Level One)
  - Trainee $20
  - Instructor $20

- **Introduction to Test Instruments** (7.5 Hours)
  - (Module ID 32110-07; from Industrial Maintenance Mechanic Level One)
  - Trainee $20
  - Instructor $20

- **Material Handling and Hand Rigging** (15 Hours)
  - (Module ID 32111-07; from Industrial Maintenance Mechanic Level One)
  - Trainee $20
  - Instructor $20

- **Mobile and Support Equipment** (10 Hours)
  - (Module ID 32112-07; from Industrial Maintenance Mechanic Level One)
  - Trainee $20
  - Instructor $20

- **Lubrication** (12.5 Hours)
  - (Module ID 32113-07; from Industrial Maintenance Mechanic Level One)
  - Trainee $20
  - Instructor $20

- **SMAW Equipment and Setup** (5 Hours)
  - (Module ID 29107-09; from Welding Level One)
  - Trainee $20
  - Instructor $20

**PAPERBACK ISBN**

Trainee Guide: $67
Instructor’s Guide: $67
978-0-13-215439-0
978-0-13-215440-6

**PAPERBACK**

- **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. 84 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.

**L2 POWER GENERATION MAINTENANCE MECHANIC**

**MODULES**

- **Basic Layout** (20 Hours)
  - (Module ID 32201-07; from Industrial Maintenance Mechanic Level Two)
  - Trainee $20
  - Instructor $20

- **Advanced Trade Math** (30 Hours)
  - (Module ID 32301-08; from Industrial Maintenance Mechanic Level Three)
  - Trainee $20
  - Instructor $20

- **Introduction to Piping Components** (5 Hours)
  - (Module ID 32202-07; from Industrial Maintenance Mechanic Level Two)
  - Trainee $20
  - Instructor $20

- **Copper and Plastic Piping Practices** (5 Hours)
  - (Module ID 32203-07; from Industrial Maintenance Mechanic Level Two)
  - Trainee $20
  - Instructor $20

**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.

**PAPERBACK ISBN**

Trainee Guide: $97
Instructor’s Guide: $97
978-0-13-215441-3
978-0-13-215408-6

**To Order Call:** 1-800-922-0579
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Power Line Worker

To address the need for one standardized and nationally recognized Power Line Worker curriculum, NCCEC 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
Instructor $20
(Module ID 49107-11) Covers the specialized tools used by line workers, including hat sticks, as well as universal tool accessories. Also covers ladders and work platforms; crimpers; cable cutters; pneumatic tools; and powder-activated tools.

Aerial Framing and Associated Hardware (80 Hours)
Trainee $20
Instructor $20
(Module ID 49108-11) Explains how to install guys to support a utility pole, as well as how to install the equipment on the pole to support conductors. Includes procedures for the installation of cross-arms, transformers, and conductors.

Utility Service Equipment (15 Hours)
Trainee $20
Instructor $20
(Module ID 49109-11) Provides descriptions and operations instructions for use of the digger derrick, bucket truck, crane truck, and aerial lift. Also covers safety requirements; inspection and maintenance; driving and setup operations; and emergency procedures.

Rigging (12.5 Hours)
Trainee $20
Instructor $20
(Module ID 49110-11) Provides descriptions and instructions for use of the digger derrick, bucket truck, crane truck, and aerial lift. Also covers 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
Instructor $20
(Module ID 49111-11) Provides instructions for the storage, loading, and transport of wooden utility poles. Includes use of the digger derrick to dig the hole and install the pole. Also covers pole removal using a hydraulic jacking device.

Trenching, Excavating, and Boring Equipment (7.5 Hours)
Trainee $20
Instructor $20
(Module ID 49112-11) Covers the use and maintenance of trenching equipment, backhoe/loaders, and horizontal directional drilling equipment for the installation of direct-buried power lines. Includes a review of safety guidelines related to buried utilities.

Introduction to Electrical Test Equipment (7.5 Hours)
Trainee $20
Instructor $20
(Module ID 49113-11) Introduces the basic test equipment used by electrical workers to test and troubleshoot electrical circuits. Also covers specialized line worker test equipment, including the high-voltage detector, phase rotation tester, megohmmeter, phasing stick, and hi-pot tester.

Power Line Worker

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
Instructor $20
(Module ID 49102-11) Covers the safety equipment and safety practices associated with the special hazards of power line work, including electrical and arc flash hazards; traffic control; trenching; horizontal directional drilling; working in confined spaces; and safe entry into a substation.

Introduction to Electrical Circuits (7.5 Hours)
Trainee $20
Instructor $20
(Module ID 49103-11) Provides a general introduction to electricity and DC circuits, including theory of voltage, current and resistance, basic DC circuits, and Ohm’s law. Also introduces the test equipment used in power line work.

Introduction to Electrical Theory (7.5 Hours)
Trainee $20
Instructor $20
(Module ID 49104-11) Describes how to calculate voltage, current, and resistance values in series, parallel, and combination DC circuits using Ohm’s law. Also includes a basic description of grounding and bonding.

Climbing Wooden Poles (80 Hours)
Trainee $20
Instructor $20
(Module ID 49105-11) Describes how to safely climb a wooden utility pole. Covers climbing equipment, inspection of equipment, pole inspection, climbing techniques, and pole-top rescue.

Climbing Structures Other Than Wood (40 Hours)
Trainee $20
Instructor $20
(Module ID 49106-11) Explains the equipment, safety practices, and climbing techniques required to climb towers. Hazards associated with the environment, such as snakes, birds, insects, and weather hazards, are also covered.

Alternating Current and Three-Phase Systems (17.5 Hours)
Trainee $20
Instructor $20
(Module ID 80201-11) Introduces the development of both single- and three-phase alternating current. Analyzes the relationship of AC phases and introduces key components used to refine AC power. Discusses the operation of transformers and introduces advanced AC concepts such as reactive power and the power factor.

Aerial Distribution Equipment (25 Hours)
Trainee $20
Instructor $20
(Module ID 80202-11) Identifies the various equipment components found on overhead distribution system poles and describes the function of each, including transformers, reclosers, fuses, sectionalizers, capacitor banks, and voltage regulators.

Cable and Conductor Installation and Removal (20 Hours)
Trainee $20
Instructor $20
(Module ID 80203-11) Describes the types of conductors and cables used in overhead and underground residential distribution systems and the equipment and procedures used to install and remove them. Includes methods used to splice conductors.
Underground Residential Distribution (URD) Systems (30 Hours)
Trainee $20
Instructor $20
(Module ID 82020-11) 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
Instructor $20
(Module ID 82045-11) 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.

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

Introduction to Smart Grids (2.5 Hours)
Trainee $20
Instructor $20
(Module ID 80305-12) 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.

Conduit Installations (10 Hours)
Trainee $20
Instructor $20
(Module ID 82004-12) Describes the purpose and arrangement of grounding systems installed beneath a substation. Covers the materials of construction and the approaches to reliable ground system connections. Introduces safety concerns and precautions associated with substation and grounding grid expansion.

Grades (15 Hours)
Trainee $20
Instructor $20
(Module ID 82003-12) 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.
Concrete Work (35 Hours)
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)
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)
Instructor $20  ISBN 978-0-13-266185-0
(Module ID 38201-11; from Intermediate Rigger)

L3 POWER LINE WORKER: SUBSTATION
LEVEL 3

Curriculum Notes
- 167.5 Hours
- Published: 2012

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 3)

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

Medium- and High-Voltage Equipment Installation (25 Hours)
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.

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

Connectors, Conductor Terminations, and Splicing (25 Hours)
Instructor $20  ISBN 978-0-13-296803-4
(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.

Equipment Testing and Maintenance (30 Hours)
(Module ID 82306-12) Describes the protective functions required in the substation environment to defend against overloads, fault currents, and other incidents that can disrupt service or damage the system. Offers coverage of the components used to provide both protection and system control. An introduction to the various protective relay schemes used in today’s substations is included.

System Protection and Control (12.5 Hours)
(Module ID 82302-12) Presents the typical installation procedures for primary substation components. Identifies the common and unique factors related to the proper installation of transformers, circuit breakers, capacitors, reactors, bus systems, and insulators. A discussion of corona and how proper installation techniques can prevent it is also included.

Fundamentals of Crew Leadership (20 Hours)
(Module ID 46101-11; see p. 69)

IEEE Power Line Worker: Distribution Level Two
(Module ID 81201-11; from Power Line Worker: Distribution Level Two)

IEEE Power Line Worker: Transmission Level Two
(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.

System Protection and Control (12.5 Hours)
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 cleaning, foundations, framing and erection, guyin and anchoring, and grounding and bonding.

Transmission Equipment Installation (50 Hours)
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)
(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.

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)
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)
(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)
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)
Field Safety

Safety Learning Series

The Safety Learning Series consists of three separate titles comprising a suggested education path: the Basic Safety module from Core Curriculum, Field Safety, and Safety Technology. The curriculum was built on industry best practices by a team of safety professionals and meets the training needs of the craft professional, safety technician, and safety manager.

The modularized structure of the curriculum enables companies to cost-effectively customize training programs and offer industry credentials through the NCCER Registry System. The Safety Learning Series has been recognized by the 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.

Electrical Safety (5 hours)
Trainee S20
Instructor S20
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 S20
Instructor S20
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 S20
Instructor S20
ISBN 978-0-13-340364-0
Module ID 75110-13 (Covers common safety precautions related to steel-erection work, including controlled decking zones, hazardous materials and equipment precautions, tool safety, and appropriate personal protective equipment.)

Heavy Equipment, Forklift, and Crane Safety (5 hours)
Trainee S20
Instructor S20
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 S20
Instructor S20
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 S20
Instructor S20
Module ID 75124-13 (Explains the safety precautions required when transporting, handling, rigging, stacking, and storing various types of loads. It also covers safe lifting procedures.)

Managing Electrical Hazards

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

Basic Safety

(Construction Site Safety Orientation)
12.5 Hours
Revised: 2015
Module ID 00101-15

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## SAFETY TECHNOLOGY

### MODULES

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### 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 75201-16) 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 75205-16) 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)
- **Instructor $20** ISBN 978-0-13-453893-8

(Module ID 75219-16) 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)
- **Instructor $20** ISBN 978-0-13-453897-6

(Module ID 75220-16) 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)
- **Instructor $20** ISBN 978-0-13-453900-3

(Module ID 75221-16) 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)
- **Instructor $20** ISBN 978-0-13-453899-0

(Module ID 75222-16) 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)

(Module ID 75223-16) 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.

### Permits and Policies (5 Hours)
- **Instructor $20** ISBN 978-0-13-451736-0

(Module ID 75224-16) 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.

### Incident Investigations, Policies, and Analysis (5 Hours)
- **Instructor $20** ISBN 978-0-13-451734-6

(Module ID 75225-16) 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)
- **Instructor $20** ISBN 978-0-13-451736-0

(Module 75226-16) 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.

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