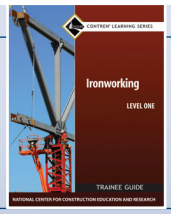
L1 IRONWORKING



LEVEL 1

Curriculum Notes

- 237.5 Hours (includes Core)
- Revised: 2011, Second Edition
- Downloadable instructor resources are available.
- A Spanish translation is available. Please see NCCER's online catalog for more information.

PAPERBACK	ISBN
Trainee Guide: $74.99	978-0-13-213714-0

MODULES

The modules listed below are included in the Trainee Guide. The following ISBNs are for ordering individual modules only.

Introduction to the Trade *(5 Hours)*
ISBN 978-0-13-213800-0
(Module ID 30101-11) Discusses the historical development of the ironworking trade. Explains personal qualities that contribute to successful employment. Describes the organization and purpose of apprenticeship training, and the safety obligations of the employer and employee.

Trade Safety *(12.5 Hours)*
ISBN 978-0-13-213801-7
(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)*
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)*
ISBN 978-0-13-213804-8
(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)*
ISBN 978-0-13-213805-5
(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)*
ISBN 978-0-13-213806-2
(Module ID 30106-11) Describes the use and inspection of equipment and hardware used in rigging. Describes slings and explains how to determine sling capacities and angles. Covers the selection and inspection of rigging equipment, including block and tackles, chain hoists, come-alongs, jacks, and tuggers.

Rigging Practices *(15 Hours)*
ISBN 978-0-13-215102-3
(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)*
ISBN 978-0-13-215103-0
(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)*
ISBN 978-0-13-215104-7
(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)*
ISBN 978-0-13-215106-1
(Module ID 30110-11) Describes the purpose and function of aligning and plumbing steel structures, the tools that are used, and the procedures for performing the plumbing and aligning. Identifies and explains column base and baseplate components and foundation failures.

Oxyfuel Cutting *(17.5 Hours)*
ISBN 978-0-13-215107-8
(Module ID 29102-09; from *Welding Level One, Fourth Edition)* Explains the safety requirements for oxyfuel cutting. Identifies oxyfuel cutting equipment and setup requirements. Explains how to light, adjust, and shut down oxyfuel equipment. Trainees will perform cutting techniques that include straight line, piercing, bevels, washing, and gouging.

Introduction to Arc Welding *(22.5 Hours)*
ISBN 978-0-13-215108-5
(Module ID 30112-11) Identifies welding equipment and processes. Describes safety precautions associated with arc welding. Explains how to identify weld joints, their dimensions, and applications from welding symbols and drawings. Describes how to set up and use SMAW equipment and explains the governing welding codes.

Bar Joists and Girders *(5 Hours)*
ISBN 978-0-13-215109-2
(Module ID 30113-11) Explains how to recognize types of bar joists and how they are designated. Describes the proper procedures for rigging and storing steel joists. Explains the use of joist girders in steel joist construction systems and the proper erection procedures for bar joists. Includes *OSHA Subpart R*.

Metal Decking *(10 Hours)*
ISBN 978-0-13-215110-8
(Module ID 30114-11) Identifies decking types and profiles and how decking is packaged, shipped, and stored. Describes erecting decking and job-site safety. Discusses the effects of deck penetrations and damage. Includes *OSHA Subpart R*.

Field Fabrication *(15 Hours)*
ISBN 978-0-13-215111-5
(Module ID 30115-11) Identifies the safety hazards associated with field fabrication. Describes how to use common layout tools. Explains how to fabricate angle iron, channel, T-shapes, and W-shapes to given dimensions.

L2 IRONWORKING

LEVEL 2

Curriculum Notes

- 162.5 Hours
- Revised: 2011, Second Edition
- Downloadable instructor resources are available.

PAPERBACK	ISBN
Trainee Guide: $99.99	978-0-13-257822-6

MODULES

The modules listed below are included in the Trainee Guide. The following ISBNs are for ordering individual modules only.

Trade Math *(25 Hours)*
ISBN 978-0-13-266447-9
(Module ID 30201-11) Explains fractions and basic math, and includes multiple opportunities for practical applications.

Weld Quality *(10 Hours)*
ISBN 978-0-13-275109-4
(Module ID 29106-09; from *Welding Level One, Fourth Edition*) 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

Position Arc Welding *(20 Hours)*
ISBN 978-0-13-266448-6
(Module ID 30202-11) Identifies and explains weld joints, weld positions, and open V-butt welds. Describes how to prepare arc welding equipment and how to make flat welds, horizontal welds, vertical welds, and overhead welds.

Forklifts *(17.5 Hours)*
ISBN 978-0-13-266449-3
(Module ID 30203-11) Identifies the basic components of forklifts and the corresponding hand signals. Explains safe practices and how to perform inspections. Covers how to read load charts and how to operate forklifts.

Continued on following page

Trade Drawings Two *(10 Hours)*
ISBN 978-0-13-266451-6
(Module ID 30204-11) Introduces types of structural plans and describes the information included on each type. Presents the sequences of erection plans for each step of construction and identifies the symbols and abbreviations used on drawings.

Intermediate Rigging *(10 Hours)*
ISBN 978-0-13-266181-2
(Module ID 38201-11; from *Intermediate Rigging, First Edition*) Describes basic procedures for using various slings in hitches and calculating sling stress. Introduces tools and equipment used for the lateral movement of loads without a crane. Trainees learn how to reeve block and tackle, invert loads with hoists, and drift a load between two hoists.

Structural Ironworking Two *(30 Hours)*
ISBN 978-0-13-266454-7
(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)*
ISBN 978-0-13-266455-4
(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)*
ISBN 978-0-13-266456-1
(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)*
ISBN 978-0-13-266457-8
(Module ID 30208-11) Identifies survey equipment and uses. Explains the proper set up and use of a builder's level and a theodolite. Covers how to shoot elevations, sweep a column for plumb, and set up over a point and back sight to another point.

L3 IRONWORKING

LEVEL 3

Curriculum Notes

- 150 Hours
- Revised: 2012, Second Edition
- Downloadable instructor resources are available.

PAPERBACK	ISBN
Trainee Guide: $99.99	978-0-13-257785-4

MODULES

The modules listed below are included in the Trainee Guide. The following ISBNs are for ordering individual modules only.

Applied Trade Math *(5 Hours)*
ISBN 978-0-13-292280-7
(Module ID 30313-12) Explains the math needed to calculate the size of cribbing or blocking needed for a load; parts of line, maximum load, and line pull for lifting operations; sling capacities; and load distribution for two-crane lifts.

Flux Core for Ironworking *(40 Hours)*
ISBN 978-0-13-292281-4
(Module ID 30314-12) Describes the equipment and methods used in flux core arc welding (FCAW). Includes proper selection and use of filler metals and shielding gases, as well as techniques for performing fillet and V-groove welding in various positions.

Stud Welding *(10 Hours)*
ISBN 978-0-13-292282-1
(Module ID 30304-12) Introduces the stud welding process, stud welding safety, and identifies the equipment used to weld studs. Provides step-by-step procedures to set up welding equipment and guidelines to make acceptable stud welds with proper stud placement. Explains testing of stud welds.

Structural Ironworking Three *(10 Hours)*
ISBN 978-0-13-292283-8
(Module ID 30312-12) Explains the techniques used to plumb, align and guy steel structures, including the associated hazards and risks. Provides information and procedures related to the installation of trusses and curtain walls.

Advanced Rigging *(10 Hours)*
ISBN 978-0-13-266189-8
(Module ID 38301-11; from *Advanced Rigging, First Edition*) Explains how load weight and center of gravity affect lifting and crane stability. Load calculations for multi-crane lifts are presented, along with the application of equalizer beams. The movement of loads up an inclined plane and the line pull required are examined in detail. The module concludes with guidance in the rigging and handling of rebar bundles.

Precast/Tilt-Up Erection *(12.5 Hours)*
ISBN 978-0-13-292285-2
(Module ID 30311-12) Describes the fabrication and uses of precast concrete elements and cast-in-place tilt-up wall systems. Focuses on rigging practices associated with these two distinct construction methods and the role of ironworkers in their installation.

Special Application Hoisting Devices *(10 Hours)*
ISBN 978-0-13-292286-9
(Module ID 30307-12) Explains techniques for rigging and moving equipment using a variety of hoisting devices, including gin poles, Chicago booms, A-frames, davits, balance beams, pump handles, high lines, caterpillar dollies, rollers. Also covers special cranes, including derricks, gantries, HLDs, trolley cranes, and jacking frames.

Survey Equipment Use and Care Two *(15 Hours)*
ISBN 978-0-13-292287-6
(Module ID 30315-12) Focuses on the total station and its uses, including setup and controls. It includes information on primary and secondary control points and procedures for turning horizontal angles and plumbing columns and wall panels.

Pre-Engineered Systems *(5 Hours)*
ISBN 978-0-13-292288-3
(Module ID 30302-12) Identifies the structural components and accessories of metal buildings and describes their installation. Describes the pre-erection and erection procedures that apply to their installation and the safety precautions associated with their installation.

Miscellaneous/Ornamental Ironworking *(5 Hours)*
ISBN 978-0-13-292289-0
(Module ID 30303-12) Identifies the types of ornamental metal and describes the different types of components used in ornamental ironworking. Explains the skills required to fabricate and install ornamental components safely.

Grating and Checkered Plate *(5 Hours)*
ISBN 978-0-13-292290-6
(Module ID 30316-12) Provides general information and procedures for the installation and attachment of gratings and checker plate. Describes the rigging methods associated with grating and checkered plate.

Air Carbon Arc Cutting and Gouging *(12.5 Hours)*
ISBN 978-0-13-610530-5
(Module ID 29104-09; from *Welding Level One, Fourth Edition*) Introduces air-carbon arc cutting equipment and processes. Identifies the electrodes and safe operation of the equipment. Provides step-by-step instructions for performing air-carbon arc washing and gouging activities.

Demolition *(10 Hours)*
ISBN 978-0-13-292291-3
(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.