

# Ironworker (Generalist) Level 3

## Ironworker (Generalist)

**Unit:** A4 Machinery and Equipment

**Level:** Three

**Duration:** 35 hours

Theory: 28 hours

Practical: 7 hours

### Overview:

This unit's major outcomes include improved knowledge of procedures Ironworkers use to install and remove machinery and equipment, including storage bins, tanks, hoppers, and conveyors.

### Objectives and Content:

**Percent of  
Unit Mark (%)**

- |                                                                                                                                                                                                                                      |            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| <b>1. Describe types of machinery and equipment that Ironworkers remove/install, including the tools required and the significant terminology associated with this aspect of trade practice.</b>                                     | <b>35%</b> |
| a. Types and significant characteristics of machinery and equipment that ironworkers remove/install, including: <ul style="list-style-type: none"><li>• Storage tanks</li><li>• Bins</li><li>• Hoppers</li><li>• Conveyors</li></ul> |            |
| b. Selection and use of tools and equipment required for installation/removal job-assignments                                                                                                                                        |            |
| c. Technical terminology                                                                                                                                                                                                             |            |
| <b>2. Describe and demonstrate safe work practices including interpretation of technical documents re: removal/installation of equipment and machinery.</b>                                                                          | <b>15%</b> |
| a. Special hazards, precautions, and safe work-practices                                                                                                                                                                             |            |
| b. Interpreting codes and regulations                                                                                                                                                                                                |            |
| c. Deriving information from technical drawings and specifications                                                                                                                                                                   |            |
| <b>3. Describe procedure for installing and removing machinery and equipment.</b>                                                                                                                                                    | <b>50%</b> |
| a. Installation procedures, including hand signals <ul style="list-style-type: none"><li>• Moving/transporting</li><li>• Assembling and erecting</li><li>• Leveling and aligning</li><li>• Supporting and securing</li></ul>         |            |
| b. Removal procedures                                                                                                                                                                                                                |            |

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## Ironworker (Generalist)

**Unit:** A5 Work Planning

**Level:** Three

**Duration:** 21 hours

Theory: 14 hours

Practical: 7 hours

### Overview:

This unit's major outcomes include improved knowledge of the procedures used to plan and organize work-tasks.

<b>Objectives and Content:</b>	<b><u>Percent of Unit Mark (%)</u></b>
<b>1. Identify sources of information relevant to task planning.</b>	<b>10%</b>
a. Documents	
b. Drawings	
c. Knowledgeable persons	
d. Clients	
<b>2. Describe procedures used to plan work tasks.</b>	<b>50%</b>
a. Scheduling	
b. Material/equipment selection	
<b>3. Describe and demonstrate procedures for organizing /storing tools, equipment, materials, and supplies on the Ironworker jobsite.</b>	<b>40%</b>

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## Ironworker (Generalist)

**Unit:** A6 Orientation II: The Job of Journeywork (AC Board Standard)

**Level:** Three

**Duration:** 21 hours

Theory: 14 hours

Practical: 7 hours

### Overview:

Ironworker technical training offers an entry-level orientation to the challenges of apprenticeship learning. The present unit introduces senior apprentices to the responsibilities of workplace *teaching* that they will assume as supervising journeypersons. Tradeworkers have a particularly rich tradition of refreshing and sharing their skills from one generation of practitioners to the next. This unit orients senior apprentices to some of the practical and conceptual tools that can enable them to contribute to this trade heritage when they themselves become certified journeypersons. The journeyperson's obligation to assist trade learners to develop skills and knowledge is complex and challenging. It involves safety considerations, employer expectations, provincial regulations, as well as the tradition of skills stewardship that links modern practice with the long history of workplace teaching and learning that defines the apprenticeable trades. The ability to offer timely, appropriate support to apprentices is itself an important area of trade learning. This unit presents material intended to help refine this ability through reflection and discussion by senior apprentices, and dialogue with their instructor. The detailed descriptors under each unit objective reflect Manitoba and Canadian standards prescribed for journey-level supervisory capabilities, as well as key topics in current research on the importance of workplace teaching and learning in trades-apprenticeship systems. Thus, descriptors represent suggested focal points or guidelines for potentially-worthwhile exploration. Delivery of this content will vary with the discretion of individual instructors, and with the experiences senior apprentices bring forward for group/individual reflection on the skills-stewardship dimension of their own future practice as journeypersons.

<b>Objectives and Content:</b>	<b><u>Percent of Unit Mark (%)</u></b>
<b>1. Describe the scope, substance, and significance of journey-level status.</b>	<b>25%</b>
<ul style="list-style-type: none"> <li>a. Historical background and trade traditions               <ul style="list-style-type: none"> <li>• Origin, definition, and examples of journey-level status</li> <li>• Obligations to employers, trade clients, and apprentices</li> <li>• Concept of skills stewardship, and its rationale</li> <li>• Customary responsibilities of journeyperson as workplace trainer/supervisor</li> <li>• Overview development of formal systems for regulating/recognizing journey-level competence in designated apprenticeable trades</li> <li>• Contributions of 'unticketed journeymen' and other informally-qualified Insulators to workplace trade-learning</li> <li>• Achievements/limitations of informal systems for workplace training</li> <li>• Canadian/other trends (e.g. succession planning in the trades; recognition of credentials and prior learning; defined standards for on-the-job trades education and training)</li> </ul> </li> <li>b. Regulatory/legal dimensions of journey-level status in designated trades               <ul style="list-style-type: none"> <li>• Rights and obligations re: Canada's Interprovincial 'Red Seal' program (Red Seal rationale, scope, and products, including the National Occupational Analysis [NOA], and Interprovincial examinations</li> <li>• Manitoba provincial requirements [e.g., <i>Apprenticeship and Certification Act; General Regulation; the Ironworker Trade Regulation</i>; relevant policies of the Apprenticeship and Certification Board of Manitoba]</li> <li>• Trade-specific requirements re: Practical Training supervision and documentation; importance of quality assurance and broad-scope coverage of prescribed task-content; ratios, etc.</li> </ul> </li> <li>c. Other (as may be specified by instructor)</li> </ul>	

**2. Compare/contrast role-options and responsibilities of the supervising journeyperson. 25%**

- a. Recognizing the variability of supervision assignments, situations, and roles
- b. Source and specification of the supervision assignment
- c. Formal vs. informal roles (e.g. mandated by an employer's succession plan)
- d. Implicit vs. explicit standards and content: training goals are/are not codified; assessment measures are/are not used,
- e. Accountability for results: subject/not subject to third-party notification; completion of supervision assignment itself is/is not assessed by third party; journeyperson is/is not required to prepare performance evaluation that could affect apprentice's employability or wage-rate, etc.
- f. General vs. task- or job-specific supervision assignments: e.g. scope of expectations re: content of supervisory task(s)
- g. Long-term vs. short-run supervision assignments – e.g., considerable latitude/little latitude for apprentice to learn from mistakes
- h. Formally vs. informally structured – e.g. supervision assignment is part of a prescribed cycle of assignments involving coordination among multiple journeypersons; apprentice is trained according to an individual Training Plan negotiated with employer
- i. Typology of common supervisory role-options and what is implied by each:
  - Coach role: is often initiated by someone other than apprentice, and limited to a particular skill set, task, or production requirement
  - Mentor role : often initiated by apprentice, and relatively open-ended regarding content, duration, etc.
  - Peer role: typically involves individual upgrading or cross-training of one journeyperson by another; can include senior apprentice assisting less-experienced trade learner
  - Managerial role(s): can shade over into hire/fire issues as lead-hand or site-boss
  - Coordinator role: often a senior-level journeyperson appointed by an organization to assume responsibilities for monitoring progression of groups of apprentices
  - Other roles: may be improvised by journeyperson
- j. Possibilities, perils, and likelihood of role-overlap in 'real-life' trade practice
- k. Importance of clarifying all roles, expectations, and implications involved in accepting a supervision assignment
- l. Role of Apprenticeship Training Coordinator (ATC), Apprenticeship Manitoba
- m. Resources for developing skills and knowledge re: providing journey-level supervision
  - Books and journals (not always trade-specific)
  - Websites
  - Conversation with trade instructors, journeypersons, and peers
  - Workshops
- n. Other (as may be specified by instructor)

**3. Describe/demonstrate common requirements re: providing journey-level supervision. 25%**

- a. Review Unit A1 content re: challenges/opportunities of Apprenticeship learning adapted to journey-level supervision assignments and a journey-level standpoint
  - Application of adult education concepts to trades teaching/learning (e.g. responsibilities and expectations of adult learners)
  - Practical significance of 'styles' of adult learning and teaching
  - Helping apprentices to integrate Technical Training (in school) and Practical Training (on-the-job) learning experiences
  - Providing help and guidance re: new tasks and skills
  - Providing help and guidance re: fixing mistakes
  - Learning/teaching "the ropes" – socialization of learner within a community of trade practice (e.g. how to borrow a tool, interrupt a journeyperson, 'recruit' an advisor )
  - Coverage/documentation of prescribed tasks and subtasks (Ironworker NOA), including responsibility re: logbook sign-off (where applicable)
  - Consultation with Apprenticeship Training Coordinator (ATC), Manitoba Apprenticeship Branch
  - Communicating with apprentices and employers about supervision assignments and assignment specifications, including the limits of the trainers' own responsibilities and competence (e.g. substance-abuse intervention)
  - Benefits of maintaining a personal record of achievements, ideas, and needs as a workplace trainer
- b. Individual reflection and guided group discussion re: personal experiences of workplace learning as an apprentice
  - Identification of best and worst practices of supervising journeypersons
  - Assessment of personal experiences (if any) to date in supervising, coaching, or guiding other people to learn or improve their skills (e.g. entry-level apprentices, members of athletic team, younger family members, etc.), and how this might compare/contrast with the journey-level support of apprenticeship learning
  - Identification of workplace and other factors that can contribute to good and bad trades teaching/learning experiences

- Development of personal standards re: responsibility to share one's knowledge and skill with others in the workplace (e.g., use/misuse of humour, rigour, discretion, craft-pride, etc.)
- c. Comparison/contrast of discussion results with current knowledge/resources re: workplace skills coaching methods as applicable to journey-level supervision assignments
  - Qualities of a good workplace coach
  - Components of workplace skills coaching
  - Processes and recommended practices re: workplace coaching
  - Troubleshooting problems re: supervision assignments
- d. Other (as may be specified by instructor)

**4. Complete Modules 1 to 3, *Workplace Coaching Skills* (Burnaby, BC: 1995), ISBN 1-55139-030-2 (or equivalent). 10%**

- a. Identifying purpose of the lesson
  - Explaining the point of the lesson
  - Role of the coach in specific coaching situation
  - Other (specified by instructor)
- b. Linking the lesson
  - Learner needs
  - Lesson sequence
  - Focus on learner
  - Selection/timing of coaching opportunities
- c. Demonstration of skill/task to be learned
  - Starting the coaching session
  - Demonstration
  - Hands-on trial
  - Recap for learner

**5. Complete Modules 4 to 6, *Workplace Coaching Skills* (Burnaby, BC: 1995), ISBN 1-55139-030-2 (or equivalent). 15%**

- a. Practice of skill/task to be learned
  - Nature and importance of practice
  - Setting up for learner practice
  - Types of practice
  - Recycling and reinforcing skill/task learning
- b. Providing feedback to the learner
  - Value of feedback
  - Kinds of feedback
  - Guidelines and tips
- c. Assessment
  - Value of assessing learner progress
  - Assessing level of skill
  - Planning further steps toward skill/task mastery

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## Ironworker (Generalist)

**Unit:** A7 Pre-IP Review: Certification Exam Preparation (CEP)

**Level:** Three

**Duration:** 58 hours

Theory: 58 hours

Practical: 0 hours

### Overview:

This unit offers senior apprentices a systematic review of skills and knowledge required to pass the Interprovincial (IP) 'Red Seal' Examination. It promotes a purposeful personal synthesis between on-the-job learning and the content of in-school technical training. The unit includes pertinent information about the broad significance of Red Seal Interprovincial certification and the main features of the Interprovincial exam. Information about practical strategies/resources for mastering study materials supplements the unit's trade-specific content. It is intended that apprentices who seriously tackle the objectives of this unit should be able to approach the IP exam with well-founded confidence. But the unit also promotes a consolidation of study practices, trade knowledge, and self-awareness to help meet the longer-term requirements of further learning throughout one's working life as a certified journeyman.

**Note: No percentage-weightings for test purposes are prescribed for this unit's objectives. Instead, a 'Pass/Fail' grade will be recorded for the unit in its entirety.**

<b>Objectives and Content:</b>	<b><u>Percent of Unit Mark (%)</u></b>
<p><b>1. Describe the significance, format, and general content of the Interprovincial (Red Seal) Examination for the Trade of Ironworker.</b></p> <p>a. Scope and aims of Red Seal system; value of certification</p> <p>b. Obligations/entitlements of candidates for IP certification</p> <ul style="list-style-type: none"> <li>• Relevance of IP Examination to current, accepted trade practices; industry-based national validation of test items</li> <li>• Supplementals Policy (retesting) of Apprenticeship Manitoba</li> <li>• Confidentiality of examination content; the certified journeyman's own stake in examination security (value of credential)</li> <li>• Limitations on use of calculators (e.g. dedicated, pre-programmed builders' calculator not allowed)</li> </ul> <p>c. Multiple-choice (four-option) item format; Red Seal/Apprenticeship Manitoba standards for acceptable test items (e.g. no "trick"-type questions; specifications for use of metric/Imperial units)</p> <p>d. Important government materials relevant to the IP Examination for apprentice Ironworkers</p> <ul style="list-style-type: none"> <li>• National Occupational Analysis (NOA); prescribed scope of the skills and knowledge which comprise the trade</li> <li>• NOA "Pie-chart" and its relationship to content-distribution of IP Examination items</li> <li>• Special significance of subtask-level NOA descriptors re: exam content</li> <li>• Manitoba Apprenticeship Program materials</li> </ul>	<b>NA</b>
<p><b>2. Identify resources, strategies, and other key considerations for maximizing successful completion of written exams used in certifying tradeworkers.</b></p> <p>a. Personal preparedness</p> <ul style="list-style-type: none"> <li>• Proper rest/nutrition; eye-testing</li> <li>• Making room for a personal study regimen: appropriate prior communication with family members, friends, and employers about exam-related commitments/needs; identifying – and concluding – all necessary arrangements for minimizing distractions/disruptions</li> </ul>	

- Focused reflection on prior experience – good and bad -- in test situations (e.g. Unit Tests), especially with respect to what the apprentice already has learned re: personal characteristics, learning styles, exam anxiety, and strategies (e.g. time management) for effective performance in test situations.
- b. **Self-assessment, consultation, and a Personal Study Plan**
    - Preliminary self-assessment of individual strengths/weaknesses in trade-related skills and knowledge; usefulness of old tests and Apprenticeship Program materials; personal reflection re: in-school and on-the-job components of the Program, as well as the relationship between these two components; usefulness of consultation with journeypersons, appropriate peers, the Apprenticeship Training Coordinator (ATC), and/or personal mentors
    - Use(s) of approved textbooks, chapter tests, study guides, and note-taking in preparing for an examination
    - Study groups: perils and possibilities
    - Formulation, and submission for instructor's comments, of a personal study plan, including an approximate timetable, which describes/schedules a course of action for reviewing all relevant material(s) and for strengthening areas of deficient skills/knowledge in anticipation of the Red Seal Examination
  - c. Other (specified by instructor)
3. **Review program content re: Ironworker trade foundations.**
    - a. Structure and scope of the Ironworker trade
    - b. Trade safety awareness
    - c. Tools and equipment
    - d. Machinery and equipment
    - e. Work planning
    - c. Workplace skills-coaching of apprentices by journeypersons
  4. **Review program content re: Ironworker trade communications and technical documents.**
    - a. Computer applications re: learning and practicing the trade
    - b. Communication and trade documentation
    - c. Drawings
  5. **Review program content re: welding and cutting.**
    - a. Oxy-fuel cutting
    - b. Welding
    - c. Plasma-arc cutting
  6. **Review program content re: work at heights involving rigging, hoisting and crane equipment.**
    - a. Access equipment
    - b. Hoisting, lifting, and rigging
    - c. Conventional and hydraulic cranes
    - d. Tower cranes
    - e. Electrical overhead-travelling cranes (EOTCs)
  7. **Review program content re: concrete and rebar.**
    - a. Reinforcing
    - b. Pre-stressing and post-tensioning
    - c. Precast-concrete erection and dismantling
  8. **Review program content re: structural steel and metal-building systems.**
    - a. Structural components
    - b. Pre-engineered structures
    - c. Structural-steel erection and dismantling
  9. **Review program content re: ornamental ironwork and other trade-specialties.**
    - a. Ornamental ironwork
    - b. Miscellaneous ironwork
    - c. Maintaining and upgrading ironwork

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## Ironworker (Generalist)

**Unit:** D6 Electric Overhead-Travelling Cranes (EOTCs)

**Level:** Three

**Duration:** 14 hours

Theory: 7 hours

Practical: 7 hours

**Overview:**

This unit's major outcomes include improved knowledge of procedures to assemble and install EOTCs, including the components and accessories associated with this variety of modern hoisting-equipment technology.

<b>Objectives and Content:</b>	<b><u>Percent of Unit Mark (%)</u></b>
<b>1. Describe EOTCs and EOTC-applications, including components, attachments and significant technical terminology.</b>	<b>50%</b>
a. EOTC components, attachments, and accessories, including their characteristics characteristics and preferred application(s) <ul style="list-style-type: none"><li>• Crane rails</li><li>• End trucks</li><li>• Wheels</li><li>• Bridge girders</li><li>• Hoist and trolleys</li><li>• Crane stop</li><li>• Load blocks</li><li>• Cab</li><li>• Bus bar</li></ul>	
b. Controls <ul style="list-style-type: none"><li>• Cab-operated</li><li>• Remote-operated</li><li>• Pendant</li><li>• Bridge girders</li><li>• Hoist and trolleys</li></ul>	
<b>2. Describe and demonstrate procedures for EOTC assembly and installation.</b>	<b>10%</b>
a. Hand signals	
b. Electronic communications	
c. Audible/visual	
<b>3. Describe and demonstrate procedure for communication re: the operation of EOTC equipment.</b>	<b>40%</b>
a. Hand signals	
b. Electronic communications	
c. Audible/visual	

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## Ironworker (Generalist)

**Unit:** E4 Pre-Cast Concrete Erection/Dismantling

**Level:** Three

**Duration:** 42 hours

Theory: 28 hours

Practical: 14 hours

### Overview:

This unit's major outcomes include improved knowledge of precast-concrete members and their components, including their application, erection, and dismantling.

<b>Objectives and Content:</b>	<b><u>Percent of Unit Mark (%)</u></b>
<p><b>1. Identify precast concrete members and components, and describe the Ironworker trade-activities as well as the significant technical terminology associated with their use.</b></p> <ul style="list-style-type: none"><li>a. Technical terminology for work with precast-concrete products</li><li>b. Important kinds of precast-concrete members/components, their main applications, and important characteristics, including:<ul style="list-style-type: none"><li>• Panels (horizontal and vertical)</li><li>• Beams</li><li>• Joists</li><li>• Columns</li><li>• Single tees</li><li>• Twin tees</li><li>• Bearing piles</li></ul></li></ul>	<b>30%</b>
<p><b>2. Describe and demonstrate safe work practices including interpretation of technical documents re: erecting precast-concrete members and components.</b></p> <ul style="list-style-type: none"><li>a. Special hazards, precautions, and safe work-practices re: precast-concrete erecting and dismantling</li><li>b. Interpreting codes and regulations</li><li>c. Deriving information from technical drawings and specifications</li></ul>	<b>20%</b>
<p><b>3. Describe and demonstrate procedures to prepare and execute a plan to erect, finish, dismantle, and remove precast-concrete members and components on the jobsite.</b></p> <ul style="list-style-type: none"><li>a. Procedure for selecting tools/equipment, including preferred application(s) to precast-concrete erection/dismantling projects</li><li>b. Procedures for preparing to erect and finish precast-concrete members and components<ul style="list-style-type: none"><li>• Site preparation</li><li>• Equipment set-up</li><li>• Determination of weight(s)</li><li>• Rigging</li><li>• Materials handling</li><li>• Lay-out</li></ul></li></ul>	<b>50%</b>

- c. Procedure for erecting members/components
  - Attaching to support clips
  - Aligning, leveling, and plumbing
  - Fastening (including welding and bolting)
  - Grouting
- d. Procedure for finishing members/components
  - Removing lugs
  - Grinding
  - Painting
  - Packing
  - Caulking
  - Installing gaskets
  - Air-sealing
  - Grouting
- e. Procedure for dismantling and removing precast-concrete members
  - Tie-wires
  - Bar supports
  - Coupling devices
- c. Reinforcing-steel procedures and preferred practices, including
  - Site preparation
  - Interpretation of technical drawings and specifications
  - Selection and set-up of equipment
  - Concrete-Reinforcing Steel Institute (CSRI)
  - Requirements/rationale re: maintaining prescribed clearances and tolerances (e.g. protection of reinforcing steel, maintaining structural integrity, etc.)

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## Ironworker (Generalist)

**Unit:** G1 Ornamental Ironwork

**Level:** Three

**Duration:** 49 hours

Theory: 24 hours

Practical: 25 hours

### Overview:

This unit's major outcomes include improved ability to demonstrate knowledge of ornamental ironwork, including procedures for its fabrication, installation, and repair/removal.

<b>Objectives and Content:</b>	<b><u>Percent of Unit Mark (%)</u></b>
<p><b>1. Describe the variety of ornamental ironwork, including the characteristics, applications, and significant technical terminology associated with this Ironworker trade specialty.</b></p> <ul style="list-style-type: none"> <li>a. Stairways</li> <li>b. Railings</li> <li>c. Curtain walls</li> <li>d. Other (specified by instructor)</li> </ul>	<b>25%</b>
<p><b>2. Interpret codes, regulations, and other technical sources re: ornamental ironwork procedures and safe work-practices.</b></p> <ul style="list-style-type: none"> <li>a. Codes and regulations</li> <li>b. Technical drawings and project specifications</li> <li>c. Identification of special hazards, precautions, and safe work-procedures re: ornamental-ironwork projects</li> </ul>	<b>15%</b>
<p><b>3. Describe and demonstrate procedures for fabricating, installing, finishing, and repair of ornamental ironwork.</b></p> <ul style="list-style-type: none"> <li>a. Selection/use of tools, including techniques and applications re: ornamental ironwork</li> <li>b. Procedures for fabricating ornamental ironwork, including:               <ul style="list-style-type: none"> <li>• Shop</li> <li>• Field</li> </ul> </li> <li>b. Procedures for fabricating ornamental ironwork, including:               <ul style="list-style-type: none"> <li>• Site preparation</li> <li>• Materials handling and movement</li> <li>• Layout</li> <li>• Installation/securement</li> </ul> </li> <li>c. Procedures for finishing ornamental ironwork               <ul style="list-style-type: none"> <li>• Grinding</li> <li>• Painting</li> <li>• Filing</li> <li>• Polishing</li> </ul> </li> <li>d. Procedure for repair of ornamental ironwork.</li> <li>c. Procedure for removal of ornamental ironwork</li> </ul>	<b>60%</b>

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# Ironworker (Generalist)

**Unit:** G2 Miscellaneous Ironwork

**Level:** Three

**Duration:** 40 hours

Theory: 20 hours

Practical: 20 hours

## Overview:

This unit's major outcomes include improved ability to demonstrate knowledge of miscellaneous ironwork, including stairways/platforms, catwalks, railings, and fences, with particular reference to the procedures for fabrication, installation, and finishing that are associated with this trade-specialty.

<b>Objectives and Content:</b>	<b><u>Percent of Unit Mark (%)</u></b>
<b>1. Describe the variety of miscellaneous ironwork, including the characteristics, applications, and significant technical terminology associated with this Ironworker trade specialty.</b>	<b>30%</b>
a. Stairways and their components	
b. Railings and their components	
c. Ladders and platforms and their components	
d. Catwalks and their components	
e. Fences and their components	
d. Other (specified by instructor)	
<b>2. Interpret codes, regulations, and other technical sources re: miscellaneous-ironwork procedures and safe work-practices.</b>	<b>20%</b>
a. Codes and regulations	
b. Technical drawings and project specifications	
c. Identification of special hazards, precautions, and safe work-procedures re: miscellaneous-ironwork projects	
<b>3. Describe and demonstrate procedures for fabricating, installing, finishing, and repairing of miscellaneous ironwork.</b>	<b>50%</b>
a. Selection/use of tools, including techniques and applications re: miscellaneous ironwork	
b. Procedures for fabricating miscellaneous ironwork, including:	
• Shop	
• Field	
b. Procedures for fabricating miscellaneous ironwork, including:	
• Site preparation	
• Materials handling and movement	
• Layout	
• Installation/securement	
c. Procedures for finishing miscellaneous ironwork	
• Grinding	
• Painting	
• Filing	
• Polishing	
d. Procedure for repair of miscellaneous ironwork.	
c. Procedure for removal of miscellaneous ironwork	

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## Ironworker (Generalist)

**Unit:** G3 Maintaining and Upgrading Ironwork

**Level:** Three

**Duration:** 35 hours

Theory: 14 hours

Practical: 21 hours

### Overview:

This unit's major outcomes include improved ability to demonstrate knowledge of the procedures required to maintain as well as upgrade ironwork structures and components.

<b>Objectives and Content:</b>	<b><u>Percent of Unit Mark (%)</u></b>
<b>1. Describe special considerations re: the scope and substance of maintenance/repair, upgrading, and troubleshooting practices in the Ironworker trade.</b>	<b>20%</b>
a. Major targets/contexts of Ironworker maintenance and upgrading activity: <ul style="list-style-type: none"><li>• Steel and FRP structural shapes</li><li>• Pre-stressed/pre-tensioned concrete</li><li>• Plates</li><li>• Nonferrous metals</li><li>• Conveyor components</li><li>• Fasteners and sealants</li><li>• Welding products</li></ul>	
b. General considerations re: troubleshooting repair/maintenance assignments, including: <ul style="list-style-type: none"><li>• Scope of trouble-shooting, including its open-endedness as an area of ongoing trade-learning</li><li>• Scheduled (preventive) maintenance vs. emergency</li><li>• Costs/benefits of maintenance options</li><li>• Concept of 'critical incidents' re: individual/collective technical learning</li><li>• Common resources for maintenance/troubleshooting</li></ul>	
c. Other (specified by instructor)	
<b>2. Describe and demonstrate Ironworker-trade procedures re: planning and completing the repair of structural, mechanical, and miscellaneous components.</b>	<b>20%</b>
a. Procedure for assessing current condition of components <ul style="list-style-type: none"><li>• Identification/use of manufacturer specifications and other technical information</li><li>• Recognition and location of inspection targets/criteria</li><li>• Selection/use of appropriate diagnostic tools (e.g. calipers, torque wrenches, etc.)</li><li>• Protocols concerning documentation/communication and recommended remedial action re: observed defects.</li></ul>	
b. Procedure for field-fabrication of components <ul style="list-style-type: none"><li>• Laying-out for fabrication</li><li>• Fitting of fabricated components and original components</li></ul>	
c. Procedure for replacement of components <ul style="list-style-type: none"><li>• Recognition of/compliance with regulatory and other requirements, where applicable</li><li>• Prescribed techniques re: installation/removals, use of temporary supports,</li></ul>	
d. Procedure re: verifying completed repair/installation satisfies applicable standards	

- e. Procedure for performing scheduled (preventive) maintenance
  - Comparison/contrast re: non-scheduled or emergency repair
  - Use of manufacturer specifications and other technical information

**3. Describe and demonstrate Ironworker-trade procedures re: the dismantling and removal of structural, mechanical, and miscellaneous components. 20%**

- a. Procedure to ensure the decommissioning of structure/components
  - Identification/use of manufacturer specifications and other technical information
  - Recognition and location of inspection targets/criteria
  - Selection/use of appropriate diagnostic tools (e.g. calipers, torque wrenches, etc.)
  - Protocols concerning documentation/communication and recommended remedial action for observed defects.
- b. Procedure for planning sequence of disassembly
- c. Procedure for removal of components
- d. Scheduled (preventive) maintenance vs. emergency
- e. Other (as specified by instructor)

**4. Complete the Senior-Level Ironwork Maintenance/Upgrading Demonstration Project *per* instructor specifications. 40%**

- a. Inspection, analysis, and preparation re: Project Work Plan
  - Assessment, identification, and documentation of deficiencies requiring repair/maintenance and upgrading (including critical consideration of reasonable options and alternatives, if any)
  - Presentation, discussion, and revision of detailed Maintenance/Upgrading Project Work Plan
  - Risk assessment re: hazards/precautions and safe work practices re: maintenance/upgrading (e.g. environmentally-hazardous materials; stability of components undergoing repair/removal/replacement, etc.)
- b. Implementing of Maintenance/Upgrading Project Work Plan
  - Sequencing of operations
  - Selection and use of tools and equipment
  - Performing field fabrication, including use of falsework
  - Set-up and use of trolley beam and hoist
- c. Other (specified by instructor)

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