



# **Ironworker** **(Structural/Ornamental)** **Course Outline**

**2022**

# TRAINING PROFILE CHART

This Training Profile Chart represents Saskatchewan Apprenticeship and Trade Certification Commission (SATCC) technical training at the topic level. Implementation for harmonization took place progressively.

SATCC Level One	Transcript Code	Hours
Safety Awareness	SFTY 134	18
Access Equipment	EQPT 157	15
Tools and Equipment	EQPT 156	20
Hoisting Lifting and Rigging 1	RIGG 130	33
Welding 1	WLDR 133	18
Drawing Interpretation	BPRT 130	40
Cranes 1	EQPT 158	18
Structural Components	STRU 130	36
Building Erection 1	STRU 131	12
Ironworker Mathematics (Exceed)	MATH 118	30
		<b>240</b>

SATCC Level Two	Transcript Code	Hours
Hoisting Lifting and Rigging 2	RIGG 200	22
Drawing Interpretation	BPRT 202	48
Cranes 2	EQPT 200	60
Erection and Dismantling	STRU 204	12
Pre-engineered Structures	STRU 208	20
Building Erection 2	STRU 205	18
Reinforcing Rebar	MATE 200	12
Ironworker Mathematics (Exceed)	MATH 221	30
Welding 2	WELD 217	18
		<b>240</b>

SATCC Level Three	Transcript Code	Hours
Pre-engineered Structures	STRU 300	26
Welding 3	WELD 307	6
Cranes 3	EQPT 303	40
Machinery and Equipment	EQPT 304	30
Pre-cast Concrete	MATE 301	24
Building, Dismantling and Storage	STRU 301	18
Miscellaneous and Ornamental Ironwork	MATE 300	54
Equipment Certifications	EQPT 302	12
		<b>210</b>

### Exceed Topics

Throughout this guide to course content there are topics, which exceed the scope of work set out by the Ironworker Structural/Ornamental National Occupational Analysis (NOA). Industry in Saskatchewan has deemed certain topics to fall within the scope of work of Ironworker Structural/Ornamental trade and therefore require technical training to also cover these topics.

# TECHNICAL TRAINING COURSE CONTENT

This chart outlines the model for Saskatchewan Apprenticeship and Trade Certification Commission (SATCC) technical training sequencing. For the harmonized level of training, a cross reference to the Red Seal National Occupational Analysis (NOA) apprenticeship technical training sequencing, at the learning outcome level, is provided.

Implementation for harmonization was implemented progressively.

<b>Level One</b>	<b>8 weeks</b>	<b>240 hours</b>
<b>Safety Awareness</b>		<b>18 hours</b>
<ul style="list-style-type: none"><li>• demonstrate the use of safety equipment, their applications, maintenance, and procedures for use</li><li>• demonstrate safe work practices</li><li>• discuss regulatory requirements pertaining to safety</li><li>• you will be able to use fall arrest equipment</li></ul>		
<b>Tools and Equipment</b>		<b>20 hours</b>
<ul style="list-style-type: none"><li>• identify types of hand, electric, hydraulic, pneumatic and gas tools, and levelling and alignment instruments</li><li>• demonstrate the use of tools and equipment, their applications, maintenance, and storage, and procedures for use</li><li>• use explosive actuated tools</li></ul>		
<b>Access Equipment</b>		<b>15 hours</b>
<ul style="list-style-type: none"><li>• demonstrate the use of ladders, scaffolding and aerial work platforms, their applications, limitations, and procedures for use</li><li>• demonstrate safe work practices concerning the set up and use of scaffolds, ladders, and angel wings</li><li>• discuss the use of swing stages and sky climbers</li><li>• discuss the use of crane man baskets</li><li>• describe the use of aerial work platform operation</li></ul>		
<b>Hoisting, Lifting, and Rigging 1</b>		<b>33 hours</b>
<ul style="list-style-type: none"><li>• describe hoisting, lifting, and rigging equipment, their applications, limitations, and procedures for use</li><li>• discuss the procedures used to perform hoisting and lifting operations</li><li>• perform calculations required when hoisting and lifting</li><li>• demonstrate international crane hand signals</li></ul>		
<b>Welding 1</b>		<b>18 hours</b>
<ul style="list-style-type: none"><li>• describe knowledge of oxy-fuel equipment and accessories</li><li>• perform oxy-fuel cutting</li><li>• describe SMAW equipment and accessories</li><li>• perform SMAW welding</li></ul>		

<b>Drawing Interpretation and Work Planning</b>	<b>40 hours</b>
<ul style="list-style-type: none"> <li>• identify types of drawings, knowledge of drawings and their applications</li> <li>• explain the procedures used to interpret and extract information from drawings</li> <li>• prepare trade related documentation and its use</li> <li>• demonstrate knowledge of the procedures used to prepare and complete trade documentation</li> <li>• organize work tasks to facilitate effective handling of work materials</li> <li>• demonstrate effective communication practices</li> </ul>	
<b>Cranes 1</b>	<b>18 hours</b>
<ul style="list-style-type: none"> <li>• describe types of cranes, their applications, and limitations</li> <li>• perform crane lifting operations</li> <li>• interpret basic load charts</li> </ul>	
<b>Structural Components</b>	<b>36 hours</b>
<ul style="list-style-type: none"> <li>• explain structural components, their characteristics, and applications</li> <li>• perform fastening methods relating to structural steel erection</li> <li>• describe knowledge of falsework, their characteristics, and applications</li> <li>• discuss the procedures used to erect and dismantle falsework</li> </ul>	
<b>Building Erection 1</b>	<b>12 hours</b>
<ul style="list-style-type: none"> <li>• demonstrate the full erection and dismantling of a structural steel structure using a crane (dismantle to exterior skeleton)</li> <li>• interpret drawings</li> <li>• identify structural components</li> <li>• demonstrate safe worksite practices</li> <li>• demonstrate rigging techniques</li> </ul>	
<b>Industrial Mathematics</b>	<b>30 hours</b>
<ul style="list-style-type: none"> <li>• use whole numbers, and common and decimal fractions</li> <li>• perform conversions and comparisons with fractions, decimals, and percent</li> <li>• perform calculations and conversions with the metric and imperial systems</li> <li>• perform calculations for average, perimeter, area, and volume</li> <li>• solve basic problems involving common and decimal fractions</li> </ul>	

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## Level Two

8 weeks

240 hours

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### Hoisting Lifting and Rigging 2

22 hours

- calculate weights of beams, angles, channels, and hollow structural steel
  - perform calculations related to inclined planes and mechanical advantage
  - describe the use of hoisting chains, rollers, hydraulic jacks, beam clamps, air castors, tuggers, and tirsors
  - describe hydraulic gantry systems ad their components
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### Drawing Interpretation

48 hours

- interpret specifications and details on various structural steel drawings
  - interpret specifications and details on drawings depicting miscellaneous steel components, handrails, platforms, and stairs
  - interpret welding symbols
  - interpret specifications and shop fabrication drawings
  - interpret ornamental drawings
  - interpret reinforcing rebar drawings
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### Cranes 2

60 hours

- define terminology associated with cranes and lifting operations
  - describe safe work practices pertaining to cranes and crane lifting operations
  - interpret codes and regulations pertaining to cranes and crane lifting operations
  - interpret information pertaining to crane lifting operations found on drawings and specifications
  - interpret tables and charts to lift and move loads
  - explain the principle of leverage and their application to cranes
  - identify types of cranes and describe their components, characteristics, and applications
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### Erection and Dismantling

12 hours

- identify knowledge of structural steel members, their characteristics, and applications
  - erect structural steel members and components
  - demonstrate the procedures used to dismantle, remove, and store structural steel members and components
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### Pre-engineered Structures

20 hours

- read and review blueprints
  - describe pre-engineered structures and their components
  - review safe assembly of pre-engineered structures
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**Building Erection 2****18 hours**

- erect an interior structural steel component using power rigging equipment
- interpret drawings
- identify structural components
- demonstrate safe worksite practices
- demonstrate rigging techniques
- use power rigging equipment

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**Reinforcing Rebar****12 hours**

- identify types of reinforcing materials and accessories
- describe the procedures to prepare for reinforcing concrete
- demonstrate reinforcing rebar installation and tying techniques

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**Ironworker Mathematics (Exceed)****30 hours**

- use scientific numbers
- perform conversions and comparisons with percent's, rates, ratios and proportions
- perform angle measurement and calculations
- perform calculations involving circles and partial circles
- perform basic geometry observations
- solve basic problems involving perimeter, area and volume

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**Welding 2****18 hours**

- describe welding and gouging equipment and accessories
- describe safe welding practices
- perform the Flux Cored Arc Welding (FCAW)

<b>Level Three</b>	<b>7 weeks</b>	<b>210 hours</b>
<b>Pre-engineered Structures</b> <ul style="list-style-type: none"> <li>perform interpretation of drawings specific to engineered structures</li> <li>describe pre-engineered structures and their components</li> <li>erect pre-engineered structure</li> </ul>		<b>26 hours</b>
<b>Welding 3</b> <ul style="list-style-type: none"> <li>demonstrate knowledge of plasma arc cutting equipment and accessories</li> <li>use plasma arc cutting equipment</li> </ul>		<b>6 hours</b>
<b>Cranes 3</b> <ul style="list-style-type: none"> <li>define the terminology associated with EOT cranes</li> <li>describe the procedures used to communicate during EOT crane operations</li> <li>describe hazards and safe work practices pertaining to EOT cranes and EOT crane operations</li> <li>identify EOT crane components, accessories, and attachments</li> <li>identify types of EOT controls</li> <li>describe the procedures used to assemble and install EOT cranes</li> </ul>		<b>40 hours</b>
<b>Machinery and Equipment</b> <ul style="list-style-type: none"> <li>identify types of machinery and equipment and their characteristics</li> <li>describe the procedures used to install and remove machinery and equipment</li> <li>describe safe work practices pertaining to the installation and removal of machinery and equipment</li> </ul>		<b>30 hours</b>
<b>Precast Concrete</b> <ul style="list-style-type: none"> <li>describe pre-cast concrete members and their components</li> <li>describe the procedures used to erect pre-cast concrete</li> <li>describe the procedures used to dismantle pre-cast concrete</li> </ul>		<b>24 hours</b>
<b>Building Dismantling and Storage</b> <ul style="list-style-type: none"> <li>dismantle a structural steel structure using a crane</li> <li>interpret information from drawings as pertains to installation of machinery</li> <li>identify structural components pertaining to machinery and equipment installation and removal</li> <li>demonstrate safe worksite practices</li> <li>demonstrate advanced rigging procedures</li> <li>demonstrate correct sequence of component storage</li> <li>demonstrate correct trailer loading and storage of components</li> </ul>		<b>18 hours</b>
<b>Miscellaneous and Ornamental Work</b> <ul style="list-style-type: none"> <li>perform interpretation of shop drawings</li> <li>describe the components, characteristics, and applications of miscellaneous and ornamental ironwork</li> </ul>		<b>54 hours</b>



- identify the procedures used to fabricate and install miscellaneous and ornamental ironwork
- identify floor and roof decking procedures
- describe wood glulam handling and erection

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**Equipment Certifications****12 hours**

- aerial work platform operations
  - telefork operations
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# IRONWORKER (STRUCTURAL/ORNAMENTAL)

## TASK MATRIX

This chart outlines the major work activities, tasks and sub-tasks from the 2015 Ironworker (Structural/Ornamental) Red Seal National Occupational Analysis (NOA). Each sub-task details the corresponding essential skill and level of training where the content is covered. \*

\* Sub-tasks with numbers in the boxes is where the content will be delivered in training.

### A - OCCUPATIONAL SKILLS

<b>A-1 Performs occupational documentation</b>	<b>A-1.01 Interprets drawings and specifications.</b>  1, 2, 3	<b>A-1.02 Interprets standards, regulations, and procedures.</b>  1 (2, 3 In Context)	<b>A-1.03 Performs lock-out and tag-out procedures.</b>  (2, 3 In Context)		
<b>A-2 Communicates in the workplace</b>	<b>A-2.01 Communicates with co-workers.</b>  1	<b>A-2.02 Communicates with others.</b>  1	<b>A-2.03 Communicates with apprentices.</b>  1	<b>A-2.04 Uses hand signals.</b>  1, 2, 3	<b>A-2.05 Communicates electronically.</b>  1, 2, 3
<b>A-3 Uses and maintains tools and equipment.</b>	<b>A-3.01 Uses hand tools and measuring equipment.</b>  1 (2, 3 In Context)	<b>A-3.02 Uses power tools.</b>  1 (2, 3 In Context)	<b>A-3.03 Uses powder-actuated tools.</b>  1 (2, 3 In Context)	<b>A-3.04 Uses aerial work platforms.</b>  1 (2, 3 In Context)	<b>A-3.05 Uses ladders</b>  1 (2, 3 In Context)
	<b>A-3.06 Uses scaffolding</b>  1 (2, 3 In Context)	<b>A-3.07 Uses Personal Protective Equipment (PPE).</b>  1 (2, 3 In Context)	<b>A-3.08 Uses surveying equipment.</b>  1, 2, 3	<b>A-3.09 Uses welding equipment.</b>  1,3 (2 In Context)	<b>A-3.10 Uses thermal and oxy-fuel cutting equipment.</b>  1 (2, 3 In Context)
<b>A-4 Organizes work.</b>	<b>A-4.01 Organizes materials and supplies.</b>  1, 2, 3	<b>A-4.02 Marks layouts.</b>  1, 2, 3	<b>A-4.03 Maintains safe work environment.</b>  1 (2, 3 In Context)	<b>A-4.04 Assesses site hazards.</b>  1 (2, 3 In Context)	<b>A-4.05 Plans work Tasks.</b>  1, 2, 3

## B – RIGGING AND HOISTING

<b>B-5 Selects rigging equipment.</b>	<b>B-5.01 Matches load to lift capability.</b> 1, 2 (3 In Context)	<b>B-5.02 Inspects rigging equipment.</b> 1, 2 (3 In Context)	<b>B-5.03 Maintains rigging equipment.</b> 1, 2 (3 In Context)
<b>B-6 Uses hoisting and lifting equipment.</b>	<b>B-6.01 Uses hoisting equipment.</b> 1, 2 (3 In Context)	<b>B-6.02 Uses lifting equipment.</b> 1, 2 (3 In Context)	<b>B-6.03 Attaches rigging to load.</b> 1, 2 (3 In Context)

## C – CRANES

<b>C-7 Assembles and erects cranes.</b>	<b>C-7.01 Assesses crane site limitations.</b> 1, 2, 3	<b>C-7.02 Determines crane position.</b> 1, 2, 3	<b>C-7.03 Prepares bases.</b> 1, 2, 3	<b>C-7.04 Erects cranes and components.</b> 1, 2, 3
<b>C-8 Disassembles Cranes.</b>	<b>C-8.01 Disassembles crane components.</b> 1, 2, 3	<b>C-8.02 Prepares crane for transport.</b> 1, 2, 3		

## D – ERECTION, ASSEMBLY, AND INSTALLATION

<b>D-9 Installs primary and secondary structural members.</b>	<b>D-9.01 Erects falsework.</b> 1, 2, 3	<b>D-9.02 Attaches structural members</b> 1, 2, 3	<b>D-9.03 Levels, plumbs and aligns structural members.</b> 1, 2, 3	<b>D-9.04 Completes installation of structural members.</b> 1, 2, 3
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<b>D-10 Installs ornamental components and systems.</b>	<b>D-10.01 Installs curtain walls and window walls.</b> 2, 3	<b>D-10.02 Installs miscellaneous components.</b> 3	
<b>D-11 Installs conveyors, machinery and equipment.</b>	<b>D-11.01 Installs material handling systems.</b> 2, 3	<b>D-11.02 Aligns material handling systems.</b> 2, 3	<b>D-11.03 Places machinery and equipment.</b> 2, 3

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## E – MAINTENANCE AND UPGRADING

<b>E-12 Repairs components.</b>	<b>E-12.01 Assesses current condition of components.</b> 1, 2, 3	<b>E-12.02 Field fabricates components.</b> 1, 2, 3	<b>E-12.03 Replaces components.</b> 1, 2, 3	<b>E-12.04 Performs preventative maintenance.</b> 1, 2, 3
<b>E-13 Decommissions disassembles and removes structural, mechanical and miscellaneous components.</b>	<b>E-13.01 Ensures decommissioning of structure or components.</b> 1, 2, 3	<b>E-13.02 Plans sequence of disassembly.</b> 1, 2, 3	<b>E-13.03 Removes components.</b> 1, 2, 3	

*\*The Ironworker 2015 Red Seal Occupational Analysis (NOA), describing the “full scope” of the trade, can be found at [www.red-seal.ca](http://www.red-seal.ca).*

*For more detailed information on course content, please refer to the Ironworker (Structural/Ornamental) Guide to Course Content at [www.saskapprenticeship.ca](http://www.saskapprenticeship.ca).*