

Welder

Course Outline

2021-22



TRAINING PROFILE CHART

This Training Profile Chart represents Saskatchewan Apprenticeship and Trade Certification Commission (SATCC) technical training at the topic level.

Level One	Transcript Code	Hours
Print Reading	BPRT 105	10
Industrial Mathematics	MATH 125A	21
Metallurgy and Material Designations	METL 106	10
Trade Safety	SFTY 132	12
Shielded Metal Arc Welding	WLDR 111 – Theory	13
	WLDR 110 – Shop	33
Wire Feed Processes	WLDR 115 – Theory	13
	WLDR 116 – Shop	54
Oxy-Fuel Processes	WLDR 112 – Theory	12
	WLDR 1AA – Shop	18
Thermal Cutting	WELD 1BB	14
		210

Level Two	Transcript Code	Hours
Print Reading and Fabrication	BPRT 251	10
Industrial Mathematics	MATH 2AA	14
Quality Assurance	WELD 213	12
Metallurgy and Material Designation	WELD 215	11
Shielded Metal Arc Welding	WELD 252 – Theory	18
	WELD 253 – Shop	92
Gas Tungsten Arc Welding	WELD 254 – Theory	9
	WELD 255 – Shop	21
Wire Feed Processes	WELD 2AA	23
		210

Level Three	Transcript Code	Hours
Print Reading and Fabrication	BPRT 322	17
Industrial Mathematics	MATH 3AA	10
SMAW Plate/Pipe Process	WELD 311 – Theory	25
SMAW Plate Process	WELD 3AA – Shop	95
SMAW Pipe Process	WELD 3BB – Shop	20
Metallurgy	WELD 224	10
Wire Feed Processes	WELD 335 – Theory	12
	WELD 336 – Shop	21
Gas Tungsten Arc Welding	WELD 337	12
Special Welding and Cutting Processes	WELD 338	18
		240

TECHNICAL TRAINING COURSE OUTLINE

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.

Level One	7 weeks	210 hours
Print Reading and Fabrication		10 hours
<ul style="list-style-type: none"> interpret basic shop drawings interpret basic welding symbols 		
Industrial Mathematics		21 hours
<ul style="list-style-type: none"> perform arithmetic calculations using whole numbers, fractions and decimals calculate areas, volumes, and weights calculate material requirements 		
Metallurgy and Material Designations		10 hours
<ul style="list-style-type: none"> interpret steel classification information identify structural shapes, pipe and plate 		
Trade Safety		12 hours
<ul style="list-style-type: none"> describe fire-fighting equipment and procedures describe personal protective equipment and safety practices. demonstrate safe shop work practices for housekeeping, equipment and tool use describe WHMIS interpret occupational health and safety regulations describe rigging and material handling procedures and equipment 		
Shielded Metal Arc Welding – Theory		13 hours
<ul style="list-style-type: none"> describe the components and accessories of SMAW welding station. describe operation of constant current power supply. describe setup procedures. describe maintenance and troubleshooting procedures. describe SMAW safety concerns 		
Shielded Metal Arc Welding – Shop		33 hours
<ul style="list-style-type: none"> setup a SMAW welding station demonstrate safe SMAW work procedures weld 14 gauge, horizontal fillet using E6010/11 weld 14 gauge, lap joint, vertical down weld one and three pass horizontal fillet on 1/4" ms using E7018 weld vertical up single and three pass fillet on 1/4" ms using E7018 		
Oxy-Fuel Processes – Theory		12 hours
<ul style="list-style-type: none"> describe oxy-fuel equipment and accessories describe setup, use and shut down procedures describe OFW, braze welding, soldering, brazing and OFC describe OFW and OFC safety concerns 		

Oxy-Fuel Processes – Shop <ul style="list-style-type: none"> • demonstrate safe setup, use and shut down procedures • weld gauge metal and flat • perform braze welding and soldering • cut plate to fit structural shape contour • cut plate to bevel • pierce and cut holes in plate 	18 hours
Wire Feed Welding Processes – Theory <ul style="list-style-type: none"> • describe the components and accessories of a GMAW welding station • describe operation of a constant voltage power supply • describe setup procedures • describe maintenance and troubleshooting procedures • identify GMAW safety concerns • describe the function of all major components of a GMAW, MCAW and FCAW power source 	13 hours
Wire Feed Welding Processes – Shop <ul style="list-style-type: none"> • setup a GMAW weld station • set up weld joints • weld 14 gauge T-joint downhand • weld 14 gauge lap joint horizontal pulse • weld 14 gauge butt joint downhand • weld 3/8" V-groove butt joint in flat position • weld 3/8" V-groove butt joint in vertical position • weld single and three pass horizontal fillet on 3/8" T-joint using MCAW • weld aluminum horizontal T joint • weld single and three pass 3/8" horizontal fillet on flux core 	54 hours
Thermal Cutting <ul style="list-style-type: none"> • use oxy-fuel cutting to cut a nut from a bold and cut a sleeve from a shaft • use air carbon arc cutting to remove a weld, prepare grooves and back gouge • use plasma arc cutting and gouging process 	14 hours

Level Two

7 weeks

210 hours

Quality Assurance

12 hours

- identify applicable codes and standards
- describe mill test result, heat numbers and material traceability
- describe weld procedure data sheets, electrode data sheets and procedure qualification records
- interpret welder qualification information

Print Reading and Fabrication

10 hours

- interpret intermediate welding symbols
- interpret intermediate shop drawings
- use notching and mitre functions of iron worker
- use press brake
- describe weld positioners

Metallurgy and Material Designation	11 hours
<ul style="list-style-type: none"> describe the physical, chemical and mechanical properties of selected metals identify steels by classification system identify use of different metals describe shop tests used to identify metals 	
Wire Feed Welding Processes	23 hours
<ul style="list-style-type: none"> weld 3/8" MS horizontal, T-joint, 3 pass, using MCAW weld 1/4" MS, vertical, T-joint, 3 pass, using FCAW describe the welding gases and the CSA and AWS welding wire classification systems describe submerged arc welding 	
Shielded Metal Arc Welding - Theory	18 hours
<ul style="list-style-type: none"> select power sources interpret power source technical data describe the effect of adjusting all weld parameters select electrodes 	
Shielded Metal Arc Welding - Shop	92 hours
<ul style="list-style-type: none"> weld 3/8" MS Flat V-groove, butt joints – E6010 root, E7018 fill and cap weld 3/8" MS Vertical V-groove butt joints - E6010 root, E7018 fill and cap weld 3/8" MS Horizontal, V-groove butt joint - E6010 	
Gas Tungsten Arc Welding – Theory	9 hours
<ul style="list-style-type: none"> describe features of a GTAW power source select shielding gas, tungsten, current type, polarity, and amperage identify safety concerns in GTAW 	
Gas Tungsten Arc Welding - Shop	21 hours
<ul style="list-style-type: none"> weld gauge stainless steel lap joint horizontal fillet weld gauge stainless steel corner joint horizontal fillet weld gauge aluminum lap joint horizontal fillet weld gauge aluminum corner joint horizontal fillet 	
Welding Mathematics 2	14 hours
<ul style="list-style-type: none"> apply manipulations to basic formulas to match modifications to basic shapes and objects perform equivalent Imperial and Metric calculations and conversions involving weight-volume, weight-length, and vice-versa perform advanced welding problems using ratios, proportions and percent perform advanced lineal and non-lineal problems involving irregular and odd shapes and objects 	

Level Three	8 weeks	240 hours
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Print Reading and Fabrication	17 hours
<ul style="list-style-type: none"> interpret advanced welding symbols interpret basic piping drawings determine material and weld requirements from shop drawings 	

- use rolls to form material
- fabricate project

Metallurgy	10 hours
<ul style="list-style-type: none"> • describe tempering, normalizing and annealing • determine the mechanical properties of metals • describe pre-heat, interpass and post-heat considerations 	
Special Welding and Cutting Processes	18 hours
<ul style="list-style-type: none"> • perform cutting procedures on plate - 30 degree bevel, contour cut and hole • use air carbon arc cutting to remove backing plate • perform specialized welding processes - SAW, SW, PAW, TW and RW 	
SMAW Plate/Pipe Process – Theory	25 hours
<ul style="list-style-type: none"> • describe weld faults • describe joint preparation for plate • describe joint preparation for pipe 	
SMAW Plate Process – Shop	95 hours
<ul style="list-style-type: none"> • weld 3/8" MS, vertical V-groove butt joints – E6010 root, E7018 fill and cap • weld 3/8" MS, horizontal, V-groove butt joint – E6010 • perform 4GF test using 7018 	
SMAW Pipe Process – Shop	20 hours
<ul style="list-style-type: none"> • weld 6 inch schedule 80 pipe in the 2G – 5G position, E6010/7018 	
Wire Feed Welding Processes – Theory	12 hours
<ul style="list-style-type: none"> • describe the function of all major components of a GMAW, FCAW and MCAW power source • identify the applications of each process • identify all weld parameters 	
Wire Feed Welding Processes – Shop	21 hours
<ul style="list-style-type: none"> • weld 3/8" MS, flat V-groove butt joint using GMAW joint • weld 3/8" MS vertical V-groove butt joint using FCAW 	
Gas Tungsten Arc Welding (GTAW)	12 hours
<ul style="list-style-type: none"> • weld 3/8" MS flat open root butt joints in the horizontal position 	
Welding Mathematics 3	10 hours
<ul style="list-style-type: none"> • advanced welding-related calculations involving layouts, rollouts, fitting and loading/lift problems • calculation management involving compound combinations of welding related materials • calculation management involving a small project involving diagrams or partial blueprint 	

WELDER TASK MATRIX CHART

This chart outlines the major work activities, tasks and sub-tasks from the 2014 Welder National Occupational Analysis. 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. Harmonization for the Welder trade has been fully implemented for each level of technical training.

A - COMMON OCCUPATIONAL SKILLS

A-1 Maintains tools and equipment	1.01 Maintains hand, power, layout and measuring tools 1	1.02 Maintains stationary machinery 1	1.03 Maintains thermal cutting equipment 1	1.04 Maintains welding equipment 1,2	
A-2 Uses access and material handling equipment	2.01 Uses access equipment 1	2.02 Uses rigging, hoisting and lifting equipment 1			
A-3 Performs safety-related activities	3.01 Performs hazard assessments 1	3.02 Maintains safe work environment 2	3.03 Uses personal protective equipment (PPE) and safety equipment 1		
A-4 Organizes work	4.01 Uses documentation and reference material 1	4.02 Plans job tasks 1,2	4.03 Organizes materials 1,2		
A-5 Performs routine trade activities	5.01 Performs quality inspection 2,3	5.02 Marks welds, materials and parts 2,3	5.03 Controls temperature of weldments 1,2,3	5.04 Stores welding consumables 1,2	5.05 Selects welding processes and power source 1,2,3
	5.06 Performs equipment start-up and shut-down 1,2,3	5.07 Finishes final product 1,2			

B – FABRICATION AND PREPARATION OF COMPONENTS FOR WEDLING

B-6 Performs layout	6.01 Develops templates 1,2	6.02 Transfers dimensions from drawings to materials 1,2	
B-7 Fabricates components	7.01 Prepares materials 1	7.02 Fits components for welding 1,2	7.03 Assembles components 1,2

C – CUTTING AND GOUGING

C-8 Uses tools and equipment for non-thermal cutting and grinding	8.01 Selects cutting and grinding tools 1	8.02 Cuts using stationary band saws and power hacksaws 1	8.03 Cuts using shears and ironworkers 1	8.04 Cuts using hand tools 1	8.05 Cuts using handheld power tools 1
C-9 Uses oxy-fuel gas cutting (OFC) process for cutting and gouging	9.01 Selects OFC gas equipment 1	9.02 Sets up OFC equipment 1	9.03 Sets operating parameters for OFC equipment 1	9.04 Performs cut and gouge using OFC equipment 1	
C-10 Uses plasma arc cutting (PAC) process for cutting and gouging	10.01 Selects PAC equipment and consumables 1	10.02 Sets up PAC equipment 1	10.03 Sets operating parameters for PAC equipment 1	10.04 Performs cut and gouge using PAC equipment 1	
C-11 Uses air carbon arc cutting (CAC-A) process for cutting and gouging	11.01 Selects CAC-A equipment and consumables 1	11.02 Sets up CAC-A equipment 1	11.03 Sets up parameters for CAC-A equipment 1	11.04 Performs cut and gouge using CAC-A equipment 1	

D – WELDING PROCESSES

D-12 Welds using shielded metal arc welding (SMAW) process	12.01 Selects SMAW equipment and consumables 1,3	12.02 Sets up SMAW equipment 1,3	12.03 Sets operating parameters for SMAW 1,3	12.04 Performs weld with SMAW equipment 1,2,3
D-13 Welds using flux cored arc welding (FCAW), metal cored arc welding (MCAW) and gas metal arc welding (GMAW) processes	13.01 Selects FCAW, MCAW and GMAW gas, equipment and consumables 1,2,3	13.02 Sets up FCAW, MCAW, and GMAW equipment 1,2,3	13.03 Sets operating parameters for FCAW, MCAW and GMAW 1,2,3	13.04 Performs weld using FCAW, MCAW, and GMAW equipment 1,2,3
D-14 Welds using gas tungsten arc welding (GTAW) process	14.01 Selects GTAW gas, equipment and consumables 2,3	14.02 Sets up GTAW equipment 2,3	14.03 Sets operating parameters for GTAW 2,3	14.04 Performs weld using GTAW equipment 2,3
D-15 Welds using submerged arc welding (SAW) process	15.01 Selects SAW equipment and consumables 2,3	15.02 Sets up SAW equipment 2,3	15.03 Sets operating parameters for SAW 2,3	15.04 Performs weld using SAW equipment 2,3

**The Welder Red Seal National Occupational Analysis (NOA), describing the “full scope” of the trade, can be found at www.red-seal.ca*

For more detailed information on course content, please refer to the Welder Guide to Course Content at www.saskapprenticeship.ca

