



Metal Fabricator (Fitter)

Course Outline

2023

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
Layout, Fit and Fabrication	EQPT 170 - Theory	25
	EQPT 171 - Shop	45
Mathematics	MATH 190	24
Print Reading and Drafting	PRNT 182	24
Rigging and Overhead Crane	RIGG 188	42
Safety and Access Structures	SFTY 190	15
Tools and Equipment	TOOL 186	20
SMAW/FCAW/MCAW/GMAW Welding and Tacking Processes	WLDR 180	30
Oxy-Fuel/Plasma Arc Cutting	WLDR 181	15
		240

Level Two	Transcript Code	Hours
Metallurgy and Material Designation	METL 280	30
Fabrication Safety	SFTY 281	9
Drawing Interpretation	DRAW 280	24
Forming Fitting and Fabrication	METL 281 – Theory	26
	METL 282 – Shop	54
Machine Operations	EQPT 282	26
Mathematics	MATH 279	24
Layout	EQPT 283	35
Welding and Cutting Processes	WELD 279	20
		240

Level Three	Transcript Code	Hours
Quality Control	QC 380	28
Drawing Interpretation	DRAW 380	28
Layout	EQPT 380	16
Project Planning and Estimating	ESTM 385	18
Engineered Design	DSGN 380	12
Shop Organization	SHOP 381	12
Fitting and Fabrication	METL 300 – Theory	26
	METL 381 – Shop	88
Mathematics	MATH 392	12
		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 Occupational Standard (RSOS) apprenticeship technical training sequencing, at the learning outcome level, is provided.

Level One	8 weeks	240 hours
Layout, Fit, and Fabrication – Theory		25 hours
<ul style="list-style-type: none">• perform geometric constructions• develop two dimensional templates• describe use and advantages of jigs		
Layout, Fit, and Fabrication – Shop		45 hours
<ul style="list-style-type: none">• make a bend set template• make sweep templates• layout flanges• layout square grid on floor• determine plum and level• fabricate small projects		
Mathematics for Fabricator 1		24 hours
<ul style="list-style-type: none">• use arithmetic• use equation fundamentals• use metric units		
Print Reading and Drafting		24 hours
<ul style="list-style-type: none">• develop shop drawings• interpret drawings• calculate materials• interpret welding symbols• describe joint preparation		
Rigging and Overhead Crane		42 hours
<ul style="list-style-type: none">• discuss occupational health and safety regulations• discuss types of cranes• apply rigging• demonstrate signaling• calculate load estimate• establish capability of crane• demonstrate effective site evaluation• use crane controls• operate crane• discuss crane maintenance• fill out a log book• describe use of jacks• describe the use of equipment aids• identify strengths of ropes and knots		

Safety and Access Structures**15 hours**

- practice safety in the workplace
- interpret safety legislation
- describe the safe use of scaffolds, walkways, and ladders
- promote safety in the workplace
- describe confined space entry procedures

Tools and Equipment**20 hours**

- use measuring tools
- use layout tools
- use benchwork tools
- describe assembly tools
- use metal working equipment such as band saw, iron worker, press brake
- use stationary and portable grinders and sanders
- demonstrate drill, tap and thread procedures
- demonstrate deburring methods
- describe the operation of Computer Numerical Control (CNC) equipment

SMAW/FCAW/GMAW/ Welding and Tacking**30 hours**

- describe the fundamentals of electrical theory
- describe the design and operation of a SMAW power source
- tack weld specified joints using SMAW
- describe the design and operation of a GMAW power source
- describe the design and operation of a FCAW power source
- describe the design and operation of a MCAW power source
- tack weld specific joint using GMAW
- weld in flat and horizontal positions using GMAW

Oxy-Fuel and Plasma Arc Cutting**15 hours**

- oxy-fuel and plasma arc safety, equipment and consumables
- complete 90 degree and bevel cuts using manual oxy-fuel equipment
- cut structural shapes using oxy-fuel process
- use motorized cutting carriage
- cut plate using plasma arc cutting
- cut plate using CNC plasma arc cutting

Level Two

8 weeks

240 hours

Metallurgy and Material Designation

30 hours

- describe the steel making process
 - discuss the properties of metals
 - evaluate weldability
 - apply heat treatment
 - apply heat forming
 - identify industrial, structural and vessel fasteners
 - identify structural shapes and hollow structural sections
 - identify plate, sheet, grating and mesh
 - interpret CSA Code G40.21M
 - identify pipe fittings
 - discuss proper storage and handling procedures
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Fabrication Safety

9 hours

- select personal protection equipment
 - describe fall protection procedures
 - develop accident prevention awareness
 - interpret applicable sections of the Occupational Health and Safety Act and Regulations
 - complete reporting forms
 - identify additional Health and Safety organizations and their function
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Drawing Interpretation

24 hours

- interpret drawings for miscellaneous fabrication, frames, structural members and tanks
 - interpret tank drawings
 - interpret structural drawings
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Forming Fitting and Fabrication – Theory

26 hours

- describe structural connections
- describe pressure vessels
- describe types of power saws and their operation
- describe types of shears and their operation
- describe plate rolls and their operation
- describe types of ironworkers and their operation
- describe types of press brakes and their operation
- describe fixed ladder fabrication

Forming Fitting and Fabrication – Shop

54 hours

- operate power saws
- operate shears
- operate iron worker
- operate plate rolls
- bend structural shapes, pipe and hollow structural shapes
- operate press brake
- perform stair layout
- fabricate guard rails and hand rails

Machine Operations**26 hours**

- use drill press to drill, ream and tap
- perform power threading and tapping
- practice tool sharpening and metal finishing
- describe basic turning and milling operations

Mathematics**24 hours**

- use basic mathematics skills
- apply perimeter, area, and volume fundamentals
- use percentages

Layout**35 Hours**

- use parallel line development to develop templates
- use radial line development to develop templates
- use triangulation to develop templates
- develop stretch-out templates
- layout vessel components

Welding and Cutting Processes**20 hours**

- operate GMAW and SMAW equipment
- perform the FCAW and MCAW process
- evaluate SAW and its applications
- evaluate stud welding and its applications
- operate air carbon arc cutting equipment
- operate oxy-fuel cutting equipment to prepare components

Level Three

8 weeks

240 hours

Quality Control

28 hours

- discuss the benefits of quality assurance
 - identify documents typical to quality assurance
 - discuss codes and standards
 - discuss inspection methods and stages of inspection
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Drawing Interpretation

28 hours

- interpret complex welding symbols
 - interpret structural drawings
 - interpret tank drawings
 - interpret vessel drawings
 - interpret heat exchanger drawings
 - interpret piping drawings
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Layout

16 hours

- perform parallel line development for fabrication
 - perform radial line development for fabrication
 - perform triangulation for fabrication
 - perform layout for vessels including: shells, nozzles, fittings, heads, flanges, saddles, skirts, re-pads
 - perform layout for structural connections
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Project Planning and Estimating

18 hours

- determine project plan and sequence of operations
 - describe methods and processes of fabrication estimating
 - select estimating method
 - estimate material costs
 - estimate labour time and costs
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Engineered Design

12 hours

- describe general considerations of design engineering
 - describe the forces acting on buildings, bridges, and other load bearing structures
 - describe engineering solutions to design considerations and forces
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Shop Organization

12 hours

- describe the elements of good shop organization as defined by considerations for safety, productivity and efficiency
 - evaluate shop organization
 - organize shop to suit project requirements
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Fitting and Fabrication – Theory**26 hours**

- describe tank fabrication procedures and codes

Fitting and Fabrication – Shop**88 hours**

- fabricate cones and transitions
- fabricate structural steel assemblies
- fabricate pressure vessel
- complete short run manufacturing project

Mathematics**12 hours**

- use arithmetic
 - use equation fundamentals
 - use basic trigonometry
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METAL FABRICATOR (FITTER) TASK MATRIX

This chart outlines the major work activities, tasks and sub-tasks from the 2012 Metal Fabricator (Fitter) 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 Metal Fabricator (Fitter) trade has been fully implemented for each level of technical training.

A - COMMON OCCUPATIONAL SKILLS

24%

A-1 Performs safety-related functions.	1.01 Maintains safe work environment 1	1.02 Uses personal protective equipment (PPE) and safety equipment 1		
A-2 Maintains and uses tools and equipment	2.01 Maintains hand, power, layout and measuring tools and equipment 1	2.02 Maintains Stationary machinery 1	2.03 Maintains cutting and welding equipment 1	2.04 Uses access equipment 1
A-3 Organizes work	3.01 Interprets plans, drawings and specifications 1,2	3.02 Communicates with others 3	3.03 Organizes project tasks 3	
A-4 Performs quality assurance throughout fabrication and assembly process	4.01 Performs visual inspections 3 (In Context 1, 2)	4.02 Verifies measurements, welds and layout 3 (In Context 1, 2)	4.03 Tracks material and parts for traceability 3 (In Context 1, 2)	
A-5 Handles materials	5.01 Organizes material 3	5.02 Determines weights 1	5.03 Applies rigging practices 1	5.04 Operates material handling equipment 1

B – FABRICATION OF COMPONENTS

44%

B-6 Performs layout	6.01 Performs pattern development 2,3	6.02 Calculates Material allowances for various processes 1	6.03 Determines dimensions 2,3	6.04 Transfers dimensions 2,3	6.05 Makes templates 2,3
B-7 Cuts materials	7.01 Cuts material using manual plasma cutting equipment 2	7.02 Cuts material using manual oxy-fuel cutting equipment 1	7.03 Cuts material using shears 2	7.04 Cuts material using saws 1	7.05 Cuts material Using ironworkers 2
	7.06 Cuts material using computer numerical controlled (CNC) equipment 3	7.07 Drills holes 1	7.08 Cuts threads 1	7.09 Prepares joints 1,2	
	B-8 Forms materials	8.01 Forms materials using plate rollers 2	8.02 Forms materials using shape rollers 3	8.03 Forms materials using conventional and computer numerical controlled (CNC) press brakes 2	8.04 Forms materials using benders 2

C – ASSEMBLY OF COMPONENTS

32%

C-9 Fits and fastens sub-components and components	9.01 Assembles jigs 1	9.02 Determines proper sequence for assembly 3	9.03 Assembles sub-components and components 3	9.04 Sets fabricated component in place 3	9.05 Fastens components on-site 3
C-10 Performs welding activities	10.01 Applies heat prior to tack welding 1	10.02 Performs tack welding 1	10.03 Minimizes welding distortions 1	10.04 Applies welding processes 1	10.05 Corrects welding distortions 1
C-11 Completes project	11.01 Determines finishing process 3	11.02 Prepares material for finishing 3			

*The Metal Fabricator (Fitter) 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 Metal Fabricator (Fitter) Guide to Course Content at www.saskapprenticeship.ca