

## Course Parameters for Fabrication Studies

### Facilities

CTS programs centred around Fabrication Studies should include courses that link with facilities that are readily available in the school and/or community. When selecting or planning a facility for Fabrication Studies, ensure:

- adequate space for instruction
- ample storage space for materials and projects
- adequate services to run the equipment
- provision for fume extraction and welding curtains
- access to water and service doors
- appropriate ambient features that promote learning
- fire protection.

Courses that require access to facilities in addition to those present in a typical classroom setting are identified in the Course Parameters. For more information, see the corresponding course in Sections D, E and F of the *Guide to Standards and Implementation*.

### Equipment

A recommended equipment list is provided in the Course Parameters chart. Though not exhaustive, the list identifies equipment recommended as necessary to meet the course outcomes and equipment that is considered optional. Specific makes and models of equipment are to be determined at the local level.

Equipment for courses in Fabrication Studies can be obtained through a combination of purchasing, borrowing, renting, improvising and constructing. When choosing a suitable option for obtaining equipment, give consideration to:

- adequacy of budgets for purchase
- capabilities regarding in-school maintenance and storage
- the logistics and cost of renting
- potential for loan from industry, government or post-secondary agencies
- joint purchases with other organizations in the community
- opportunities for improvising or constructing.

Teachers may find it desirable to develop a list of additional materials and supplies required for specific learning activities planned within each course.

### Safety Considerations

A number of safety issues relate to the maintenance and use of specialized power equipment, handling and storage of materials and behaviour of students while working in a shop environment. Extra care should be taken to ensure that facilities and equipment are well maintained and that students understand and practise safe work habits at all times. In addition, it is also important to have procedures in place to lock out gas and power services as well as to secure tools and material supplies.

### Instructional Qualifications

Due to the nature of the Fabrication Studies strand, most courses require some form of specialized training provided primarily by recognized institutions responsible for occupational, technical or teacher preparation. Other forms of specialized training may also be provided through training seminars, workshops and other short courses. However, if a course is to be used to gain advanced standing in an apprenticeable trade, instruction must be provided by a teacher/instructor with journeyman qualifications.

Courses requiring additional instructor credentials are identified in the Course Parameters chart. For more information, see the corresponding course in Sections D, E and F of the *Guide to Standards and Implementation*.

## Credentiailling Opportunities

Students may earn credentials recognized by business, industry and post-secondary institutions by demonstrating a specific set of competencies. Based on an articulation agreement established with the Apprenticeship and Industry Training Division, Alberta Advanced Education and Career Development, students who complete specified CTS courses may be eligible to obtain advanced standing in the apprenticeship program for Welder. Further details regarding each articulation agreement, including a correlation to CTS strands and courses, are provided in Appendix 5: Planning Ahead—CTS Transitions into Post-secondary Programs and the Workplace. Additional information can be obtained by contacting the Apprenticeship and Industry Training Division, Alberta Advanced Education and Career Development. A list of local Career Development Centres throughout Alberta is also provided in Appendix 5: Planning Ahead—CTS Transitions into Post-secondary Programs and the Workplace.

For more information regarding the credential, requirement/qualification and credentiailling agency, see the corresponding course in Sections D, E and F of the *Guide to Standards and Implementation*.

## Course Parameters

### LEVEL

- 1 – Introductory
- 2 – Intermediate
- 3 – Advanced

### THEME

- A. Materials and Structures
- B. Fabrication Processes
- C. Production Systems and Processes

### EQUIPMENT

- ✓ Recommended in order to meet course outcomes
- Optional in providing access to supportive learning environments

## FABRICATION STUDIES

LEVEL	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		
THEME	A	B	B	B	B	B	C	C	C	A	A	B	B	B	B	B	B	B	B	C	C	C	C	C	B		
INSTRUCTIONAL QUALIFICATIONS	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
INSTRUCTIONAL FACILITIES	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
CREDENTIALLING OPPORTUNITIES	*	*	*		*	*					*	*	*	*	*	*								*	*		
EQUIPMENT		Basic Tools & Materials	Oxyacetylene Welding	Basic Electric Welding	Sheet Fabrication 1	Fabrication Principles	Bar & Tubular Fabrication	Foundry 1	Principles of Machining	Production Systems	Structural Engineering	Print Reading	Oxyfuel Welding	Thermal Cutting	Arc Welding 1	Arc Welding 2	Gas Metal Arc Welding 1	Sheet Fabrication 2	Sheet Fabrication 3	Forging Fundamentals	Foundry 2	Precision Turning 1	Precision Milling 1	CNC Turning	Custom Fabrication	Pipe Fitting	
		CON	1040	1050	1090	1100	1110	1120	1130	1160	2010	2020	2030	2040	2050	2060	2070	2090	2100	2110	2120	2130	2140	2150	2160	2170	
Basic set of hand tools (1)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Anvil	○	○	○	○	○	✓				○			○							✓					○		
Bench, equipment	✓			✓	✓	✓		✓		○	○							○	○	○	○	○	○		○		
Bench, metal working	✓			✓	✓	✓	✓	✓	✓	✓	✓							✓	✓	✓	○	○	○		✓		
Bender c/w accessories	○			○	○	✓															○				○	○	
Brake, box and pan	○			✓	○													✓	✓						○		
Buffer, metal (cloth and wire wheel)	○	✓	✓		○	✓	○	○	○				✓		✓	✓	✓	✓	✓						○		
Cabinet, paint storage	✓				○	✓				○										○					○		
Computer c/w printer	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	✓	○	○
Cutter, plasma arc				○	○					○				✓					○	○					○		
Drill press (floor or bench)	○	○		○	✓	✓	○	✓	○										○	○	○		○	○		○	
Drill set (met/imp)	✓	○		✓	✓	✓	✓	✓	○	✓									○	○	○		✓	✓	✓	○	

(1) A basic set of hand tools might include calipers, chisel, assorted clamps, dividers, file card, assorted files and hammers, putty knife, micrometer, pliers, centre punch, steel ruler, screwdrivers, scribe, tinsnips, soldering iron, combination square and measuring tape.

\* Refer to specific 1-credit courses listed in Sections D, E and F of the corresponding *Guide to Standards and Implementation* for additional information.

## Course Parameters

### LEVEL

- 1 – Introductory
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### THEME

- A. Materials and Structures
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### EQUIPMENT

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- Optional in providing access to supportive learning environments

## FABRICATION STUDIES

LEVEL	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
THEME	A	A	B	B	B	B	B	B	B	B	C	C	C	C	C	B
INSTRUCTIONAL QUALIFICATIONS	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
INSTRUCTIONAL FACILITIES	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CREDENTIALLING OPPORTUNITIES		*	*	*	*	*	*								*	*
EQUIPMENT	Materials Testing	Metallurgy Fundamentals	Gas Tungsten Arc Welding	Specialized Welding	Arc Welding 3	Arc Welding 4	Pipe & Tubular Welding	Automated Welding	Sheet Fabrication 4	Sheet Fabrication 5	Foundry 3	Precision Turning 2	Precision Milling 2	CNC Milling	Prefabrication Principles	Gas Metal Arc Welding 2
	3010	3020	3030	3040	3050	3060	3070	3080	3090	3110	3120	3130	3140	3150	3160	3170
Basic set of hand tools (1)	✓	○	✓	✓	✓	✓	✓	○	✓	✓	✓	✓	✓	○	✓	✓
Anvil	○														○	
Bench, equipment									○			○	○		○	
Bench, metal working	✓	✓							✓	✓		○	○		○	
Bender c/w accessories															○	
Brake, box and pan									○	✓					○	
Buffer, metal (cloth and wire wheel)	○	○					○								○	
Cabinet, paint storage															○	
Computer c/w printer	○	○	○	○	○	○	○	○	○	○	○	○	○	✓	○	○
Cutter, plasma arc															○	
Drill press (floor or bench)									○	○		○	○		○	
Drill set (met/imp)									✓	✓		✓		✓	○	

(1) A basic set of hand tools might include calipers, chisel, assorted clamps, dividers, file card, assorted files and hammers, putty knife, micrometer, pliers, centre punch, steel ruler, screwdrivers, scriber, tin snips, soldering iron, combination square and measuring tape.

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## FABRICATION STUDIES

LEVEL	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
THEME	A	B	B	B	B	B	C	C	C	A	A	B	B	B	B	B	B	B	B	C	C	C	C	C	B
INSTRUCTIONAL QUALIFICATIONS	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
INSTRUCTIONAL FACILITIES	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CREDENTIALLING OPPORTUNITIES	*	*	*		*	*					*	*	*	*	*	*								*	
EQUIPMENT	Basic Tools & Materials	Oxyacetylene Welding	Basic Electric Welding	Sheet Fabrication 1	Fabrication Principles	Bar & Tubular Fabrication	Foundry 1	Principles of Machining	Production Systems	Structural Engineering	Print Reading	Oxyfuel Welding	Thermal Cutting	Arc Welding 1	Arc Welding 2	Gas Metal Arc Welding 1	Sheet Fabrication 2	Sheet Fabrication 3	Forging Fundamentals	Foundry 2	Precision Turning 1	Precision Milling 1	CNC Turning	Custom Fabrication	Pipe Fitting
	CON	1040	1050	1090	1100	1110	1120	1130	1160	2010	2020	2030	2040	2050	2060	2070	2090	2100	2110	2120	2130	2140	2150	2160	2170
Drill, portable, heavy duty, variable speed, reversible	✓	○		✓	✓	○	○	○	○	○														○	
Folder, bar					○				○								○	✓						○	
Forge, gas fired					○	○													✓					○	
Former, vacuum				○	○																	○			
Furnace, foundry c/w accessories					○		✓		○											✓				○	
heat treating					○														○					○	
soldering				○	○	○	○		○							○		○						○	✓
Grinder, angle		✓			○	✓						○	○	○	○	○								○	✓
heavy duty		✓	✓		○	✓	○	○	○			✓	✓	✓	✓	✓			○	○				○	
tool (bench)	✓	✓		○	✓	✓		✓	○												✓	✓		○	
Heater, strip				○	○																				
Lathe, CNC, c/w accessories					○				○												○		✓	○	

\* Refer to specific 1-credit courses listed in Sections D, E and F of the corresponding *Guide to Standards and Implementation* for additional information.

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- Optional in providing access to supportive learning environments

## FABRICATION STUDIES

LEVEL	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
THEME	A	A	B	B	B	B	B	B	B	B	C	C	C	C	B	
INSTRUCTIONAL QUALIFICATIONS	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
INSTRUCTIONAL FACILITIES	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
CREDENTIALLING OPPORTUNITIES		*	*	*	*	*	*							*	*	
EQUIPMENT	Materials Testing	Metallurgy Fundamentals	Gas Tungsten Arc Welding	Specialized Welding	Arc Welding 3	Arc Welding 4	Pipe & Tubular Welding	Automated Welding	Sheet Fabrication 4	Sheet Fabrication 5	Foundry 3	Precision Turning 2	Precision Milling 2	CNC Milling	Prefabrication Principles	Gas Metal Arc Welding 2
	3010	3020	3030	3040	3050	3060	3070	3080	3090	3110	3120	3130	3140	3150	3160	3170
Drill, portable, heavy duty, variable speed, reversible									○	○					○	
Folder, bar									✓	✓					○	
Forge, gas fired															○	
Former, vacuum													○			
Furnace, foundry c/w accessories											✓				○	
heat treating		✓													○	
soldering									○	○					○	
Grinder, angle			○	○	✓	✓	✓	○							○	✓
heavy duty	○	○	○	○	✓	✓	✓	○			○				○	✓
tool (bench)	✓								○	○		✓		✓	○	
Heater, strip																
Lathe, CNC, c/w accessories														✓	○	

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## FABRICATION STUDIES

LEVEL	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		
THEME	A	B	B	B	B	B	C	C	C	A	A	B	B	B	B	B	B	B	B	C	C	C	C	C	B		
INSTRUCTIONAL QUALIFICATIONS	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
INSTRUCTIONAL FACILITIES	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
CREDENTIALLING OPPORTUNITIES	*	*	*		*	*					*	*	*	*	*	*								*			
EQUIPMENT		Basic Tools & Materials	Oxyacetylene Welding	Basic Electric Welding	Sheet Fabrication 1	Fabrication Principles	Bar & Tubular Fabrication	Foundry 1	Principles of Machining	Production Systems	Structural Engineering	Print Reading	Oxyfuel Welding	Thermal Cutting	Arc Welding 1	Arc Welding 2	Gas Metal Arc Welding 1	Sheet Fabrication 2	Sheet Fabrication 3	Forging Fundamentals	Foundry 2	Precision Turning 1	Precision Milling 1	CNC Turning	Custom Fabrication	Pipe Fitting	
		CON	1040	1050	1090	1100	1110	1120	1130	1160	2010	2020	2030	2040	2050	2060	2070	2090	2100	2110	2120	2130	2140	2150	2160	2170	
Lathe, metal c/w accessories					○		○	✓	○												○	✓	○		○		
Mill, CNC, c/w accessories					○		✓	○	○												○	○	✓		○		
Mill, vertical c/w accessories				○	○					○									✓	✓		○	○	✓		○	
Notcher				○	○					○									✓	✓					○		
Roll, slip	✓			✓	○					○								✓	✓						○		
Rotary, machine and rollers				○																					○		
Saw, band, comb. horizontal/vertical		✓			○	○			○	○			○		○	○	○			✓	○	✓	✓	○	○	○	
cut-off, abrasive					○	○			○	○			○		○	○	○			○	○				○	○	
Shear, beverly		✓	✓		○	○				○			○	○	○	○	○								○		
electric (portable)				○	○													○	○						○		
squaring	✓			✓	○				○									✓	✓						○		
Stakes c/w universal holder	○			✓	○				○									✓	✓						○		

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## Course Parameters

### LEVEL

- 1 – Introductory
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### THEME

- A. Materials and Structures
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### EQUIPMENT

- ✓ Recommended in order to meet course outcomes
- Optional in providing access to supportive learning environments

## FABRICATION STUDIES

LEVEL	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
THEME	A	A	B	B	B	B	B	B	B	B	C	C	C	C	B	
INSTRUCTIONAL QUALIFICATIONS	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
INSTRUCTIONAL FACILITIES	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
CREDENTIALLING OPPORTUNITIES		*	*	*	*	*	*							*	*	
EQUIPMENT	Materials Testing	Metallurgy Fundamentals	Gas Tungsten Arc Welding	Specialized Welding	Arc Welding 3	Arc Welding 4	Pipe & Tubular Welding	Automated Welding	Sheet Fabrication 4	Sheet Fabrication 5	Foundry 3	Precision Turning 2	Precision Milling 2	CNC Milling	Prefabrication Principles	Gas Metal Arc Welding 2
	3010	3020	3030	3040	3050	3060	3070	3080	3090	3110	3120	3130	3140	3150	3160	3170
Lathe, metal c/w accessories											○	✓			○	
Mill, CNC, c/w accessories													○	✓	○	
Mill, vertical c/w accessories											○	○	✓		○	
Notcher									○	○					○	
Roll, slip									✓	✓					○	
Rotary, machine and rollers									✓	○					○	
Saw, band, comb. horizontal/vertical	○	○	○	○	○	○	○	○			○	○	○	○	○	○
cut-off, abrasive	○	○	○	○	○	○	○	○			○	○	○	○	○	○
Shear, beverly	○		○	○	○	○		○							○	○
electric (portable)															○	
squaring									✓	✓					○	
Stakes c/w universal holder									✓	✓					○	

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LEVEL	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
THEME	A	B	B	B	B	B	C	C	C	A	A	B	B	B	B	B	B	B	B	C	C	C	C	C	C	B
INSTRUCTIONAL QUALIFICATIONS	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
INSTRUCTIONAL FACILITIES	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CREDENTIALLING OPPORTUNITIES	*	*	*		*	*					*	*	*	*	*	*									*	
EQUIPMENT	Basic Tools & Materials	Oxyacetylene Welding	Basic Electric Welding	Sheet Fabrication 1	Fabrication Principles	Bar & Tubular Fabrication	Foundry 1	Principles of Machining	Production Systems	Structural Engineering	Print Reading	Oxyfuel Welding	Thermal Cutting	Arc Welding 1	Arc Welding 2	Gas Metal Arc Welding 1	Sheet Fabrication 2	Sheet Fabrication 3	Forging Fundamentals	Foundry 2	Precision Turning 1	Precision Milling 1	CNC Turning	Custom Fabrication	Pipe Fitting	
	CON	1040	1050	1090	1100	1110	1120	1130	1160	2010	2020	2030	2040	2050	2060	2070	2090	2100	2110	2120	2130	2140	2150	2160	2170	
Table, forming layout	✓			✓	○	✓			○								✓	✓						○		
welding		✓	✓		○	✓			○			✓	✓	✓	✓	✓								○		
Tap and die set (NC/NF, met/imp)	○				✓	✓	○	✓	○	○									○		✓	✓	✓	○		
Threader, pipe					○																			○	✓	
Vise, machinist	✓	✓	○	✓	✓	✓	✓	✓	○	○		○	○	○	○	○	○	○	✓	○	✓	✓	✓	○	✓	
Welder, GMAW c/w accessories			✓		○	○			○							✓	○	○						○		
GTAW c/w accessories																										
OAW c/w accessories		✓			○	○			○			✓	✓						○					○		
SMAW c/w accessories		✓	○		○	○			○					✓	✓									○		
spot	○	○	✓	○	○				○								○	○						○		

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LEVEL	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
THEME	A	A	B	B	B	B	B	B	B	B	C	C	C	C	C	B
INSTRUCTIONAL QUALIFICATIONS	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
INSTRUCTIONAL FACILITIES	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CREDENTIALLING OPPORTUNITIES		*	*	*	*	*	*								*	*
EQUIPMENT	Materials Testing	Metallurgy Fundamentals	Gas Tungsten Arc Welding	Specialized Welding	Arc Welding 3	Arc Welding 4	Pipe & Tubular Welding	Automated Welding	Sheet Fabrication 4	Sheet Fabrication 5	Foundry 3	Precision Turning 2	Precision Milling 2	CNC Milling	Prefabrication Principles	Gas Metal Arc Welding 2
	3010	3020	3030	3040	3050	3060	3070	3080	3090	3110	3120	3130	3140	3150	3160	3170
Table, forming layout									✓	✓						
welding			✓	✓	✓	✓	✓								○	✓
Tap and die set (NC/NF, met/imp)												✓		✓		
Threader, pipe															○	
Vise, machinist	✓						✓				○	✓	✓		○	○
Welder, GMAW c/w accessories				○			○		○	○					✓	✓
GTAW c/w accessories			✓													
OAW c/w accessories				○												
SMAW c/w accessories				○			○									
spot									○	○						

\* Refer to specific 1-credit courses listed in Sections D, E and F of the corresponding *Guide to Standards and Implementation* for additional information.