



Metals Fabrication/Welding 110

2019

Department of Education and Early Childhood Development
Curriculum Branch

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1. Introduction

1.1 Mission and Vision of Educational System

The New Brunswick Department of Education and Early Childhood Development is dedicated to providing the best public education system possible, wherein all students have a chance to achieve their academic best. The mission statement for New Brunswick schools is:

Each student will develop the attributes needed to be a lifelong learner, to achieve personal fulfillment and to contribute to a productive, just and democratic society.

1.2 New Brunswick Global Competencies

New Brunswick Global Competencies provide a consistent vision for the development of a coherent and relevant curriculum. The statements offer students clear goals and a powerful rationale for school work. They help ensure that provincial education systems' missions are met by design and intention. The New Brunswick Global Competencies statements are supported by curriculum outcomes.

New Brunswick Global Competencies are statements describing the knowledge, skills and attitudes expected of all students who graduate high school. Achievement of the New Brunswick Global Competencies prepares students to continue to learn throughout their lives. These Competencies describe expectations not in terms of individual school subjects but in terms of knowledge, skills and attitudes developed throughout the curriculum. They confirm that students need to make connections and develop abilities across subject boundaries if they are to be ready to meet the shifting and ongoing demands of life, work and study today and in the future.

See Appendix 6.1.

2. Pedagogical Components

2.1 Pedagogical Guidelines

Diverse Cultural Perspectives

It is important for teachers to recognize and honour the variety of cultures and experiences from which students are approaching their education and the world. It is also important for teachers to recognize their own biases and be careful not to assume levels of physical, social or academic competencies based on gender, culture, or socio-economic status.

Each student's culture will be unique, influenced by their community and family values, beliefs, and ways of viewing the world. Traditional aboriginal culture views the world in a much more holistic way than the dominant culture. Disciplines are taught as connected to one another in a practical context, and learning takes place through active participation, oral communication and experiences. Immigrant students may also be a source of alternate world views and cultural understandings. Cultural variation may arise from the differences between urban, rural and isolated communities. It may also arise from the different value that families may place on academics or athletics, books or media, theoretical or practical skills, or on community and church. Providing a variety of teaching and assessment strategies to build on this diversity will provide an opportunity to enrich learning experiences for all students.

Universal Design for Learning

The curriculum has been created to support the design of learning environments and lesson plans that meet the needs of all learners. Specific examples to support Universal Design for Learning for this curriculum can be found in the appendices. The **Planning for All Learners Framework** will guide and inspire daily planning.

See Appendix 6.2

English as an Additional Language Curriculum

Being the only official bilingual province, New Brunswick offers the opportunity for students to be educated in English and/or French through our public education system. The EECD provides leadership from K-12 to assist educators and many stakeholders in supporting newcomers to New Brunswick. English language learners have opportunities to receive a range of instructional support to improve their English language proficiency through an inclusive learning environment. EECD, in partnership with the educational and wider communities offer a solid, quality education to families with school-aged children.

2.2 Pedagogical Guidelines

Assessment Practices

Assessment is the systematic gathering of information about what students know and are able to do. Student performance is assessed using the information collected during the evaluation process. Teachers use their professional skills, insight, knowledge, and specific criteria that they establish to make judgments about student performance in relation to learning outcomes. Students are also encouraged to monitor their own progress through self-assessment strategies, such as goal setting and rubrics.

Research indicates that students benefit most when assessment is regular and ongoing and is used in the promotion of learning (Stiggins, 2008). This is often referred to as formative assessment. Evaluation is less effective if it is simply used at the end of a period of learning to determine a mark (summative evaluation).

Summative evaluation is usually required in the form of an overall mark for a course of study, and rubrics are recommended for this task. Sample rubrics templates are referenced in this document, acknowledging teachers may have alternative measures they will apply to evaluate student progress.

Some examples of current assessment practices include:

• Questioning	• Projects and Investigations
• Observation	• Checklists/Rubrics
• Conferences	• Responses to texts/activities
• Demonstrations	• Reflective Journals
• Presentations	• Self and peer assessment
• Role plays	• Career Portfolios
• Technology Applications	• Projects and Investigations

Formative Assessment

Research indicates that students benefit most when assessment is ongoing and is used in the promotion of learning (Stiggins, 2008). Formative assessment is a teaching and learning process that is frequent and interactive. A key component of formative assessment is providing ongoing feedback to learners on their understanding and progress. Throughout the process adjustments are made to teaching and learning.

Students should be encouraged to monitor their own progress through goal setting, co-constructing criteria and other self-and peer-assessment strategies. As students become more involved in the assessment process, they are more engaged and motivated in their learning.

Additional details can be found in the Formative Assessment document.

Summative Assessment

Summative evaluation is used to inform the overall achievement for a reporting period for a course of study. Rubrics are recommended to assist in this process. Sample rubrics templates are referenced in this document, acknowledging teachers may have alternative measures they will apply to evaluate student progress.

For further reading in assessment and evaluation, visit the Department of Education and Early Childhood Development's Assessment and Evaluation site [here](#).

Cross Curricular Literacy

Literacy occurs across learning contexts and within all subject areas. Opportunities to speak and listen, read and view, and write and represent are present every day -in and out of school.

3. Subject Specific Guidelines

3.1 Rationale

Metals Fabrication 110 presents opportunities for students to use math and science in relevant and interesting ways. This production-orientated course integrates concepts of appropriate material selection, significance of design, appropriate levels of precision, and the necessity to learn and adhere to safe practices when using hand tools and stationary equipment.

This course encourages students to use and develop the right side of the brain (expressive and creative side) while incorporating the analytical skills required to design and build products. Students will learn skills required to manipulate hand tools and stationary equipment, in addition to precision skills and opportunities to practice creativity.

Metals Fabrication 110 focuses on building transferable skill sets useful to students who are planning to enter post-secondary education in the fields of engineering, mechanical technology, industrial mechanics, machinists, computer numerical control, welders/fitters, plumbing and heating, automotive, heavy equipment, or virtually any trade.

Numeracy and literacy are important components of this course. To cultivate numeracy and literacy skills, students will demonstrate proper evidence of planning using written instructions, planning sessions, drafting of project designs, and layout of metals projects.

Students will practice reading and viewing strategies when reviewing materials to be shaped using hand tools and stationary equipment. Writing and representing will be practiced when students describe the operations followed to manipulate machinery to produce products.

3.2 Course Description

Metals Fabrication 110 introduces students to applications of math, drafting and manufacturing processes. Students develop the dexterity required to safely operate hand tools & stationary equipment. Throughout the course, students are presented with problems that require literacy/math/science skills, and challenge logic comprehension to build and manufacture products/components for almost unlimited applications. Throughout the course, students will be presented with authentic situations in which they will make use of grade appropriate math and science skills/knowledge. They will also need to call on their problem-solving skills, logical-thinking, spatial-relations, and tool skills. This course prepares students to enter professions that require critical thinking to design, evaluate and/or work with people to build devices and building components. Students will learn valuable safety procedures and tool skills.

In order to successfully achieve the goals set forth by this curriculum, class size is limited to a maximum of twenty students. It must be noted that the class size may be further limited based on the physical space available to offer a safe working environment for our students.

3.3 Curriculum Organizers and Outcomes

Outcomes

The New Brunswick Curriculum is stated in terms of general curriculum outcomes, specific curriculum outcomes and achievement indicators.

General Curriculum Outcomes (GCO) are overarching statements about what students are expected to learn in each strand/sub-strand. The general curriculum outcome for each strand/sub-strand is the same throughout the grades.

Specific Curriculum Outcomes (SCO) are statements that identify specific concepts and related skills underpinned by the understanding and knowledge attained by students as required for a given grade.

Learning Outcomes Summary Chart

GCO 1	Students will examine employment practices and Occupational Health and Safety legislation.
SCO 1.1	Students will examine safe and legal workplace procedures.
SCO 1.2	Students will describe ethical and legal workplace behavior.
SCO 1.3	Students examine employment opportunities, trades designations, and the Canadian Red Seal Certification program.

GCO 2	Students will identify and care for interdisciplinary hand tools, power tools, and fasteners.
SCO 2.1	Students will identify/select and care for basic hand tools.
SCO 2.2	Students will identify/select and care for basic power tools.
SCO 2.3	Students will identify and select proper fasters for the specific application.

GCO 3	Students will choose and practice measurement, layout, welding symbols, and joint designs.
SCO 3.1	Students will select and use layout and measurement tools.

SCO 3.2	Students identify various symbols and joint designs for welding.
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GCO 4	Students will develop and demonstrate proficiency in oxy-acetylene welding, brazing, and cutting.
SCO 4.1	Students will identify the safe set-up and tear down of oxy-acetylene equipment.
SCO 4.2	Students will safely adjust the oxy- acetylene gauges.
SCO 4.3	Students will safely light and extinguish the oxy- acetylene welding torch.
SCO 4.4	Students will safely weld by creating a puddle, using OAW, on 1/8th inch mild steel plate.
SCO 4.5	Students will safely light, operate and extinguish the oxy-acetylene cutting torch.

GCO 5	Students will develop and demonstrate proficiency in electric arc welding and cutting (SMAW, GMAW, and PAC).
SCO 5.1	Students will identify and select various power sources used for electric arc welding and cutting.
SCO 5.2	Students will have an awareness of proper personal protective equipment (PPE) necessary for electrical processes.
SCO 5.3	Students will strike and maintain an arc using shielded metal arc welding (SMAW).
SCO 5.4	Students will strike and maintain an arc using gas metal arc welding (GMAW).

SCO 5.5

Students will strike and maintain an arc using plasma arc cutting (PAC).

4. Curriculum Outcomes

GCO 1 Students will examine employment practices and Occupational Health and Safety legislation.	
SCO 1.1	Students will examine safe and legal workplace procedures.
Concepts and Content	I Can – exemplars:
<p>New Brunswick Construction Safety Association (NBCSA) online training courses in Workplace Hazardous Materials Information Systems (WHMIS) and Safety Orientation to learn safe work practices regarding WHMIS and the Employment Standards Act.</p> <p>Safe body mechanics (i.e. back safety, lifting, etc.).</p> <p>Basic First Aid.</p>	<p>I can identify potential consequences for unsafe procedures.</p> <p>I can interpret WHMIS symbols as identification for hazardous products.</p> <p>I can locate and properly use safety equipment.</p> <p>I can use Personal Protective Equipment (PPE).</p> <p>I can lockout and tag-out equipment with proper procedures.</p> <p>I can give examples of potential hazards with inappropriate clothing, footwear, and jewellery.</p> <p>I can understand back safety.</p> <p>I can use proper lifting techniques.</p> <p>I can demonstrate safe working loads.</p> <p>I can understand the importance of ergonomics and body mechanics.</p> <p>I can use proper body position when using tools.</p> <p>I can respond to potential hazard or injury.</p>

GCO 1: Students will examine employment practices and Occupational Health and Safety legislation.

Resources		
Video	Website	Document
	www.nbcsa.ca/NBCSAStudent/	
	Health and Safety, Acorn WS1.1	
	https://www.worksafenb.ca/	

GCO 1: Students will examine employment practices and Occupational Health and Safety legislation.

SCO 1.2 Students will describe ethical and legal workplace behavior.		
Concepts and Content		I Can – exemplars:
<p>Interacting with customers’ property regarding appropriate responsible resource management.</p> <p>Obligations to an owner (e.g. bonding, liability, privacy).</p> <p>Examine codes of ethics of organizations and companies.</p>		<p>I can co-construct a description of appropriate workplace behavior based on my own and my peers’ experiences.</p>
Resources		
Video	Website	Document
	<p>https://www.eca.nb.ca/about/code-of-ethics/</p> <p>http://www.cba.org/Publications-Resources/Practice-Tools/Ethics-and-Professional-Responsibility-(1)/Codes-of-Professional-Conduct</p> <p>http://www.cips.ca/ethics</p>	

GCO 1: Students will examine employment practices and Occupational Health and Safety legislation.

SCO 1.3 Students will examine employment opportunities, trades designations, and the Canadian Red Seal Certification program.	
Concepts and Content	I Can – exemplars:
<p>Job descriptions and employment opportunities in the skilled trades.</p> <p>Post secondary training options have grown in New Brunswick.</p> <p>There are some trades that are designated.</p> <p>The red seal certification program has a professional designation.</p>	<p>I can discuss employment opportunities and statistics for tradespeople.</p> <p>I can explore post secondary options or apprenticeship programs for trade training.</p> <p>I can identify a designated trade.</p> <p>I can explain the Red Seal Certification Program and its professional designation RSE.</p>
Resources	
Video	<p>Website</p> <p>http://nbcc.ca/</p> <p>www.eastcoasttrades.com</p> <p>http://www.baytechcollege.ca/index.cfm</p> <p>https://www2.gnb.ca/content/gnb/en/departments/post-secondary_education_training_and_labour/Skills/content/ApprenticeshipAndTrades.html</p> <p>http://www.red-seal.ca/w.2lc.4m.2-eng.html</p> <p>Document</p>

GCO 2: Students will identify and care for interdisciplinary hand tools, power tools, and fasteners.

GCO 2 Students will identify and care for interdisciplinary hand tools, power tools, and fasteners.		
SCO 2.1 Students will identify/select and care for basic hand tools.		
Concepts and Content		I Can – exemplars:
The safety precautions and types of hammers, clamping tools, pliers, cutting tools, wrenches, and sockets.		I can identify, care for, and safely use the appropriate: clamping devices, pliers, wrenches, screwdrivers, striking tools, chisels, saws, and files.
Resources		
Video	Website Hand Tools and Power Tools, Acorn ST1.1	Document

GCO 2: Students will identify and care for interdisciplinary hand tools, power tools, and fasteners.

SCO 2.2 Students will identify/select and care for basic power tools.		
Concepts and Content		I Can – exemplars:
The safety precautions, types and classifications of: drills and drilling equipment, saws, and grinding equipment.		<p>I can identify, care for, and safely use the appropriate: electric saws, drills and fastening devices.</p> <p>I can choose the appropriate pneumatic, electric, or battery-operated tool for the task at hand.</p>
Resources		
Video	Website Hand Tools and Power Tools, Acorn ST1.1	Document

GCO 2: Students will identify and care for interdisciplinary hand tools, power tools, and fasteners.

SCO 2.3 Students will identify and select proper fasters for the specific application.		
Concepts and Content		I Can – exemplars:
Types of fasteners and their uses. Classifications of threading equipment and thread designations.		I can identify and safely use the appropriate temporary, removable, or permanent fasteners for the application (screws, bolts, nuts, washers, clips, rivets, glues, and epoxies).
Resources		
Video	Website	Document

GCO 3: Students will choose and practice measurement, layout, welding symbols, and joint designs.

GCO 3		Students will choose and practice measurement, layout, welding symbols, and joint designs.	
SCO 3.1		Students will select and use layout and measurement tools.	
Concepts and Content		I Can – exemplars:	
Basic concepts of geometric construction.		I can use common layout tools to create shapes and features on metal surfaces.	
How to avoid common errors in measurement.		I can layout a Parallel line (Appendix 6.3).	
		I can layout a square and mark its center (Appendix 6.2).	
Resources			
Video	Website	Document	
	Layout Techniques, Acorn LT1.1		

GCO 3: Students will choose and practice measurement, layout, welding symbols, and joint designs.

SCO 3.2 Students will identify various symbols and joint designs for welding.		
Concepts and Content		I Can – exemplars:
The different types of joints and welds.		I can explain the terms and symbols used for groove and fillet welds.
Factors involved in the selection of joints.		I can identify and describe welding symbol and supplementary symbol elements.
The different welding positions.		I can recognize the factors involved in the selection of joints.
Resources		
Video	Website	Document
	<u>Joint Design & Welding Symbols, Acorn JS1.1</u>	

GCO 4: Students will develop and demonstrate proficiency in oxy-acetylene welding, brazing and cutting.

GCO 4 Students will develop and demonstrate proficiency in oxy-acetylene welding, brazing and cutting.		
SCO 4.1 Students will identify the safe set-up and tear down of oxy-acetylene equipment.		
Concepts and Content	I Can – exemplars:	
Identify and explain the function of each component of oxygen and acetylene equipment. Awareness of potential hazards of handling and use of high-pressure cylinders. Flash back arrestors and backfire prevention valves.	I can tear down and assemble equipment. I can practice safe storage and handling of gas cylinders.	
Resources		
Video	Website	Document

GCO 4: Students will develop and demonstrate proficiency in oxy-acetylene welding, brazing and cutting.

SCO 4.2 Students will safely adjust the oxy- acetylene gauges.		
Concepts and Content		I Can – exemplars:
Differences in regulator settings for various applications.		I can interpret tank pressures.
Thread differences for gas fittings.		I can interpret and adjust line/working pressures for cutting and welding applications.
Potential hazards associated with incorrect tank valve opening.		
Resources		
Video	Website	Document

GCO 4: Students will develop and demonstrate proficiency in oxy-acetylene welding, brazing and cutting.

SCO 4.3 Students will safely light and extinguish the oxy- acetylene welding torch.		
Concepts and Content		I Can – exemplars:
Characteristics of neutral, oxidizing, and carburizing flames.		I can adjust torch valves to establish each flame type.
Shut down procedure to extinguish flame.		I can safely shut down torch welding applications.
Resources		
Video	Website	Document

GCO 4: Students will develop and demonstrate proficiency in oxy-acetylene welding, brazing and cutting.

SCO 4.4			Students will safely weld by creating a puddle, using OAW, on 1/8th inch mild steel plate.		
Concepts and Content			I Can – exemplars:		
Experiment with torch positioning in relation to steel plate establish and maintain puddle.			I can manipulate and maintain consistent puddle across length of plate.		
Resources					
Video		Website		Document	

GCO 4: Students will develop and demonstrate proficiency in oxy-acetylene welding, brazing and cutting.

SCO 4.5 Students will safely light, operate, and extinguish the oxy-acetylene cutting torch.		
Concepts and Content		I Can – exemplars:
Explore differences in construction between welding and cutting torches.		<p>I can adjust valves and properly light cutting torch.</p> <p>I can use oxygen cutting jet appropriately after pre-heat.</p> <p>I can extinguish and shut down oxy acetylene cutting equipment.</p>
Resources		
Video	Website	Document

GCO 5: Students will develop and demonstrate proficiency in electric arc welding and cutting (SMAW, GMAW, and PAC).

GCO 5 Students will develop and demonstrate proficiency in oxy-acetylene welding, brazing and cutting.		
SCO 5.1 Students will identify and select various power sources used for electric arc welding and cutting.		
Concepts and Content		I Can – exemplars:
The application for each power source.		I can explain potential hazards related to various power sources.
The proper power and ground connections.		I can select the proper power source for specific welding and cutting tasks.
The proper voltage and amperage settings for various applications.		
Resources		
Video	Website	Document

GCO 5: Students will develop and demonstrate proficiency in electric arc welding and cutting (SMAW, GMAW, and PAC).

SCO 5.2 Students will have an awareness of proper PPE necessary for electrical processes.	
Concepts and Content	I Can – exemplars:
<p>The various filter shades to prevent welders flash.</p> <p>The hazards of exposed skin and proper clothing necessary to prevent arc burn.</p>	<p>I can select a welding helmet with proper lens.</p> <p>I can become familiar with adjustments if using auto darkening helmet.</p> <p>I can select suitable protective clothing for welding and cutting procedures.</p>
Resources	
Video	Website
	Document

GCO 5: Students will develop and demonstrate proficiency in electric arc welding and cutting (SMAW, GMAW, and PAC).

SCO 5.3 Students will strike and maintain an arc using SMAW.		
Concepts and Content		I Can – exemplars:
Differences in electrodes and flux coatings.		I can practice scratch and tap methods of striking an arc.
Proper amperage setting for electrode selected and metal thickness.		I can identify the effects of weld by varying the current setting, angle of electrode, and rate of travel.
Electrode holder design, installing, and removal.		I can produce proper fillet welds in multiple positions on flat bar.
Positioning and rate of travel of electrode.		
Slag removal techniques and tools used.		
Resources		
Video	Website Basic SMAW, Acorn WP1.1	Document

GCO 5: Students will develop and demonstrate proficiency in electric arc welding and cutting (SMAW, GMAW, and PAC).

SCO 5.4 Students will strike and maintain an arc using GMAW.		
Concepts and Content		I Can – exemplars:
The application for each power source.		<p>I can explain potential hazards:</p> <ul style="list-style-type: none"> • related to various power • sources <p>I can select the proper power source for specific welding and cutting tasks.</p> <p>I can select a welding helmet with proper lens and become familiar with adjustments if using auto darkening helmet.</p> <p>I can select suitable protective clothing for welding and cutting procedures.</p> <p>I can identify the effects of weld by varying the amperage and voltage setting, angle of electrode, and rate and direction of travel.</p> <p>I can produce proper fillet welds in multiple positions on flat bar.</p>
The proper power and ground connections.		
The proper voltage and amperage settings for various applications.		
The various filter shades to prevent welders flash.		
The hazards of exposed skin and proper clothing necessary to prevent arc burn.		
Differences in wire and shielding gases.		
Proper amperage and voltage settings for electrode selected and metal thickness.		
Resources		
Video	Website Basic GMAW, Acorn WP3.1	Document

GCO 5: Students will develop and demonstrate proficiency in electric arc welding and cutting (SMAW, GMAW, and PAC).

SCO 5.5 Students will strike and maintain an arc using plasma arc cutting (PAC).		
Concepts and Content		I Can – exemplars:
Proper PPE for PAC.		I can describe arc cutting techniques.
Equipment set up and use.		I can identify plasma arc cutting equipment.
		I can perform set up and safe operation of plasma arc cutting equipment.
		I can perform straight line square and bevel cuts.
		I can perform curve and irregular shaped cuts.
Resources		
Video	Website	Document

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Common Content

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Subject Specific

<https://www.eca.nb.ca/about/code-of-ethics/>

[http://www.cba.org/Publications-Resources/Practice-Tools/Ethics-and-Professional-Responsibility-\(1\)/Codes-of-Professional-Conduct](http://www.cba.org/Publications-Resources/Practice-Tools/Ethics-and-Professional-Responsibility-(1)/Codes-of-Professional-Conduct)

<http://www.cips.ca/ethics>

<https://www.cwbgroup.org/acorn/acorn-secondary-schools>

6. Appendices

6.1 New Brunswick Global Competencies

Critical Thinking and Problem-Solving	Innovation, Creativity, and Entrepreneurship	Self-Awareness and Self-Management
<ul style="list-style-type: none"> • Engages in an inquiry process to solve problems • Acquires, processes, interprets, synthesizes, and critically analyzes information to make informed decisions (i.e., critical and digital literacy) • Selects strategies, resources, and tools to support their learning, thinking, and problem-solving • Evaluates the effectiveness of their choices • Sees patterns, makes connections, and transfers their learning from one situation to another, including real-world applications • Analyzes the functions and interconnections of social, ecological, and economic systems • Constructs, relates and applies knowledge to all domains of life, such as school, home, work, friends, and community • Solves meaningful, real-life, and complex problems by taking concrete steps to address issues and design and manage projects • Formulates and expresses questions to further their understanding, thinking, and problem-solving 	<ul style="list-style-type: none"> • Displays curiosity, identifies opportunities for improvement and learning, and believes in their ability to improve • Views errors as part of the improvement process • Formulates and expresses insightful questions and opinions to generate novel ideas • Turns ideas into value for others by enhancing ideas or products to provide new-to-the-world or improved solutions to complex social, ecological, and economic problems or to meet a need in a community • Takes risks in their thinking and creating • Discovers through inquiry research, hypothesizing, and experimenting with new strategies or techniques • Seeks and makes use of feedback to clarify understanding, ideas, and products • Enhances concepts, ideas, or products through a creative process 	<ul style="list-style-type: none"> • Has self-efficacy, sees themselves as learners, and believes that they can make life better for themselves and others • Develops a positive identity, sense of self, and purpose from their personal and cultural qualities • Develops and identifies personal, educational, and career goals, opportunities, and pathways • Monitors their progress • Perseveres to overcome challenges • Adapts to change and is resilient in adverse situations • Aware of, manages, and expresses their emotions, thoughts, and actions in order to understand themselves and others • Manages their holistic well-being (e.g., mental, physical, and spiritual) • Accurately self-assesses their current level of understanding or proficiency • Advocates for support based on their strengths, needs, and how they learn best • Manages their time, environment, and attention, including their focus, concentration, and engagement

Collaboration	Communication	Sustainability and Global Citizenship
<ul style="list-style-type: none"> • Participates in teams by establishing positive and respectful relationships, developing trust, and acting interdependently and with integrity • Learns from and contributes to the learning of others by co-constructing knowledge, meaning, and content • Assumes various roles on the team and respects a diversity of perspectives • Addresses disagreements and manages conflict in a sensitive and constructive manner • Networks with a variety of communities/groups • Appropriately uses an array of technology to work with others • Fosters social well-being, inclusivity, and belonging for themselves and others by creating and maintaining positive relationships with diverse groups of people • Demonstrates empathy for others in a variety of contexts 	<ul style="list-style-type: none"> • Expresses themselves using the appropriate communication tools for the intended audience • Creates a positive digital identity • Communicates effectively in French and/or English and/or Mi'kmaq or Wolastoqey through a variety of media and in a variety of contexts • Gains knowledge about a variety of languages beyond their first and additional languages • Recognizes the strong connection between language and ways of knowing the world • Asks effective questions to create a shared communication culture, attend to understand all points of view, express their own opinions, and advocate for ideas 	<ul style="list-style-type: none"> • Understands the interconnectedness of social, ecological, and economic forces, and how they affect individuals, societies, and countries • Recognizes discrimination and promotes principles of equity, human rights, and democratic participation • Understands Indigenous worldviews, traditions, values, customs, and knowledge • Learns from and with diverse people, develop cross-cultural understanding • Understands the forces that affect individuals and societies • Takes action and makes responsible decisions that support social settings, natural environments, and quality of life for all, now and in the future • Contributes to society and to the culture of local, national, global, and virtual communities in a responsible, inclusive, accountable, sustainable, and ethical manner • Participates in networks in a safe and socially responsible manner.
Foundation of Literacy and Numeracy		

6.2 Universal Design for Learning (UDL)

UDL helps meet the challenge of diversity by suggesting flexible instructional materials, techniques, and strategies that empower educators to meet these varied needs. UDL research demonstrates that the challenge of diversity can and must be met by making curriculum flexible and responsive to learner differences. UDL provides guidelines to minimize barriers and maximize learning for all.

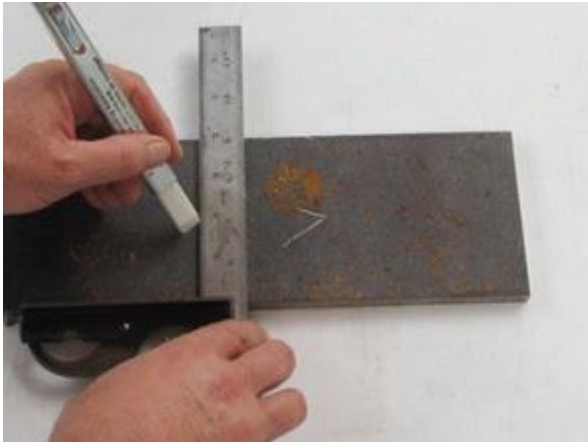
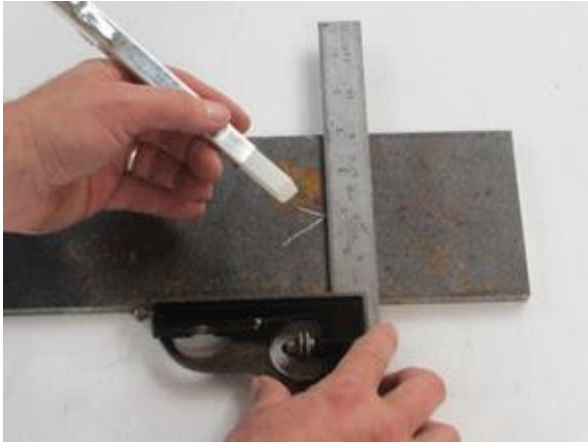
Is there a form of assistive technology that could be used to enhance/facilitate this lesson?	General Examples	Example in your subject area
Are there materials which can appropriately challenge readers to enhance this learning?	Audiobooks, EBSCO, Worldbook Online	
Are there students in this group who cannot access this learning (PLP background) and whose needs I must revisit before teaching?	PLP information/considerations	
Are there other choices that can be provided in this learning opportunity?	Differentiation models (RAFTs...)	
Is there another/a variety of media available? Only paper-based? Can it be listening? Can I add a visual component?		
Can movement be involved?	Quantum techniques	

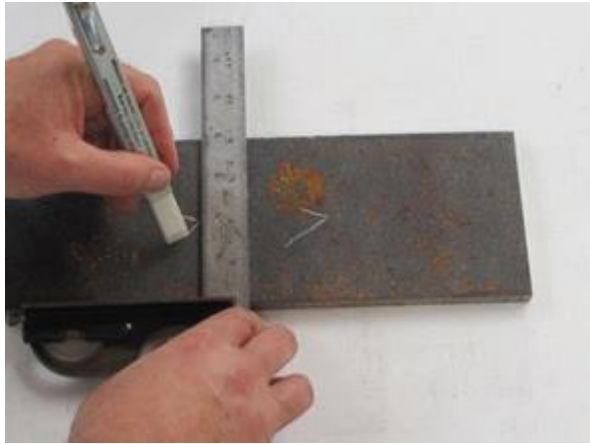
Grouping and regrouping?	Cooperative learning; team games and tournaments	
Teacher versus non- teacher centered? Instructional design strategies –...	web based lesson... project-based, student research based	
Contracts?		
Opportunities for students to propose variations to the assignments/projects?	Tic Tac Toe	
Use of art /music / technology ?	Songs, Videos, URL, YouTube	
Can I use drama ? Art....	Use of improvisation; Skits; reader’s theater; Can we make something? Demonstrate understanding visually? Paint a painting?	
Is there a plan to support the student/s who might already know this subject matter? Enrichment	Triad Model	
Does the language level need to be adjusted for the student to access this learning?	Link to adjust language level of text; CEFR information... SIOP techniques for EL learners; use of alternate texts...	

<p>Is there an independent or collaborative activity-project that would be better meet the needs of one or more students?</p>		
<p>Are there any experts that I could bring into the classroom electronically or as a guest speaker?</p>	<p>Speakers list, Skype contacts, media links, television documentary, archived historical documents</p>	
<p>Have I linked the goal to as current event or a cultural event in the student's lives? Can I make the learning more relevant?</p>	<p>Can this be applied in real life? TED talk, news item; societal trend, popular song? Can we start the unit and adjust or create it based on the students, interests or direction?</p>	
<p>Is there a hands-on experience that we could do to launch this lesson or this learning?</p>		

6.3 Layout a parallel line

The square head can be used to mark distances from an edge or create parallel lines.





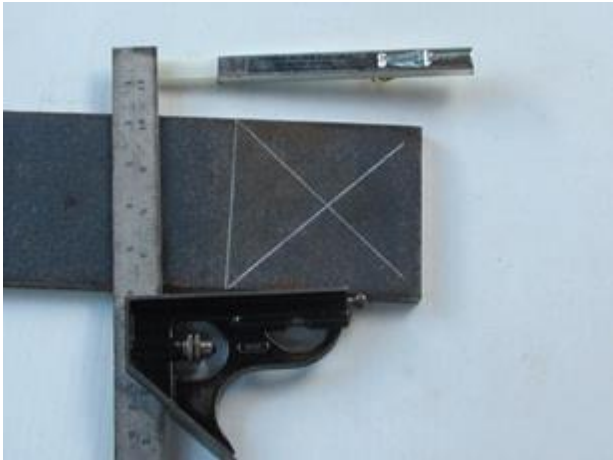
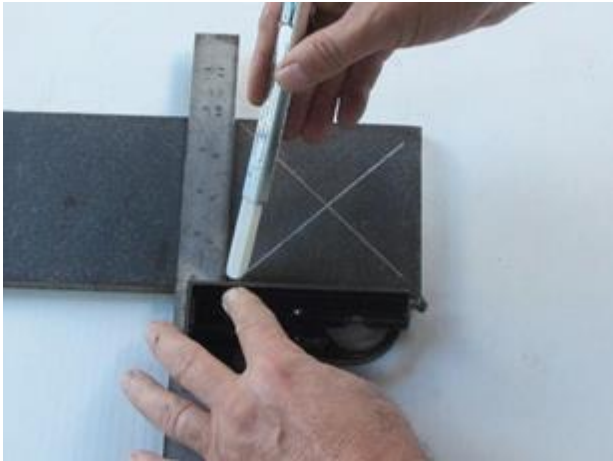
The steel rule can be slid through the head to set the face at an exact point. Layout lines short distances from edges can be quickly and precisely made this way.

6.4 Layout a square and mark its centre

Using the 45 degree face and the blade extended past the width of the intended square scribe a line from each corner of the bar.



Where the ends of the lines meet the edge of the bar scribe a perpendicular line. A square has created its center marked where the diagonal lines cross.



7. Teacher Resources

Canadian Welding Bureau Foundation

Acorn online resources: <https://www.cwbgroup.org/acorn/acorn-secondary-schools>

Suggested Units of Study

Unit of Study: Students examine employment opportunities, trades designations and the Canadian Red Seal Certification program.	
Curriculum Outcomes	Learning activities
SCO 1.3	<ul style="list-style-type: none"> • Identify different careers in the Industry. • Research future job prospects in the industry. • Research entrepreneurial opportunities in the industry. • Research career opportunities based on geographic location. • Create a career training map. (possible extension project) • Complete a “Fundamental Skills” assessment – such as the one set out by Industry Canada. • Participate in a Team Project. (Extension) • Select a topic to practice independent learning and then demonstrate their new knowledge / skill. • Maintain a portfolio (paper- based, project examples or digital representations) of abilities. • Research the manufacturing process of a product of interest to the student.

Unit of Study: Oxy-Acetylene Welding

Oxy-Acetylene Welding: This unit will introduce students to the principles of gas welding techniques. Through a series of hands on activities students will identify and safely set up and adjust oxy-acetylene equipment. Students will develop skills to gas weld mild steel after familiarizing themselves with basic joints and rods used for gas welding.

Look fors:

Students can:

- safely light and extinguish OAW torches.
- demonstrate an understanding and appreciation of all of the safety aspects of the oxy-acetylene welding process.
- demonstrate a proficiency in OAW and brazing.

Curriculum Outcomes	Suggestions for Teaching and Learning
<p>1.2 Students identify the safe set-up and tear down of oxy-acetylene equipment</p> <p>1.3 safely adjust the oxy- acetylene gauges.</p> <p>1.4 safely light and extinguish the oxy-acetylene welding torch.</p> <p>1.5 Create a puddle, using OAW, on 1/8th inch mild steel plate.</p>	<p>Lesson Suggestions:</p> <ul style="list-style-type: none"> • Through demonstration, using a complete oxy-acetylene set-up, introduce structure of tanks and safety devices and proper storage/handling practices. • Demonstrate proper connections of regulators and pressure settings • Demonstrate to students safe lighting and extinguishing practices of the welding torch. • Using 1/8” mild steel plate, demonstrate torch manipulation to establish puddle and maintain across the plate. • Using 1/8” mild steel plate, demonstrate torch manipulation for puddle while adding filler metal • Introduce basic joints for welding <p>Activity Suggestions:</p> <p>For the activities below, students can refer to Acorn course WP7.1, Basic Oxy-Fuel for safety and handling of equipment and OFW-1 and OFW-2 for practical reference.</p> <p>Students will light and maintain a neutral flame on torch.</p> <p>Welding:</p> <p>Students will:</p> <ul style="list-style-type: none"> • develop and maintain a puddle on steel plate. • manipulate torch across plate maintaining puddle consistency. • add R45 OAW wire to puddle to create weld, while maintaining consistency.

	<ul style="list-style-type: none"> • weld a 2F (horizontal) fillet weld with both R45 and braze welding electrodes. • Students will weld a 1G (flat) open groove weld. <p>Universal Design for Learning strategies</p> <p>Project Suggestions:</p>
	<p>Unit of Study: SMAW and GMAW</p> <p>In the shielded metal arc welding process, an arc is established between the end of a covered metal electrode and the workpiece to be welded. The heat of the arc melts the surfaces of the joint, as well as the metal electrode. The filler metal is carried across the arc into the weld joint and mixes with the molten base metal. As the arc is moved at a suitable travel speed along the joint, the progressive melting of the metal electrode and the base metal provides a moving pool of molten metal that cools and solidifies behind the arc. Students will engage in multiple tasks ranging from striking and maintaining an arc through practicing established skill building welds and ultimately fabricating projects.</p> <p>LOOK FOR:</p> <p>Students can identify various power sources and their use(s).</p> <p>Students can describe basic operations of the SMAW, and GMAW processes.</p> <p>Demonstrate an appreciation and understanding of all safety aspects related to SMAW and GMAW.</p> <p>Demonstrate proficiency in operating both SMAW and GMAW processes.</p>

Unit of Study: GMAW and SMAW

Curriculum Outcomes	Suggestions for Teaching and Learning
<p>1.1 Students will learn how to setup an SMAW welding system and strike an arc.</p> <p>1.2 Students will strike and maintain an arc across flat plate in the flat position.</p> <p>2.1. Students will weld in the 2F (horizontal) position.</p> <p>2.2 Students will weld in the 2F position around various shapes.</p> <p>2.3. Students will weld in the 3F (vertical) position.</p> <p>2.4 Students will weld in the 4F (overhead) position.</p>	<p>Lesson Suggestions:</p> <p>Through demonstration, the teacher will show and explain to students the basic practical and safety fundamentals of SMAW and GMAW.</p> <p>Demonstrate to students the fundamentals of body positioning in relation to various welding positions.</p> <p>Introduce students to welding with a variety of electrodes in the flat position.</p> <p>Introduce students to welding fillet welds on 3/8th flat bar in the 2F (horizontal) 3F (vertical) and 4F (overhead) positions.</p> <p>Project Suggestions:</p> <p>For their practical activities, students can refer to Acorn course WP1.1, Shielded Metal Arc Welding (SMAW) for safety and handling of equipment and SMAW PE3, PE4, PE5 , PE6, PE7, PE 11 and PE12 for practical reference.</p> <p>Reference the following link for an example of an assessment activity incorporating multiple joints and positions: <u>Fillet Welds</u></p>

Unit of Study: fabrication skills and practices required for employment in the metal fabrication industry

SCO 5.4

Additional Acorn projects here

- Sample detailed projects from [Basic GMAW, Acorn WP3.1](#) :
- [Exercise SC-2](#)
Weave beads on plate, Flat position
- [Exercise SC-7 Groove Weld](#)
Horizontal groove weld without backing