**Area of Learning: Applied Design, Skills, and Technologies — Metalwork Grade 11**

**BIG IDEAS**

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| Design for the life cycle includes consideration of social and **environmental** **impacts**. |  | Personal design interests require the evaluation and refinement of skills. |  | Tools and technologies can be adapted for specific purposes. |

**Learning Standards**

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| **Curricular Competencies** | **Content** |
| *Students are expected to be able to do the following:*Applied DesignUnderstanding context* Engage in a period of **user-centred research** and **empathetic observation** to understand design opportunities

Defining* Establish a point of view for a chosen design opportunity
* Identify potential users, intended impact, and possible unintended negative consequences
* Make inferences about premises and **constraints** that define the design space, and identify criteria for success
* Determine whether activity is collaborative or self-directed

Ideating* Generate ideas and add to others’ ideas to create possibilities, and prioritize them for prototyping
* Critically analyze how competing social, ethical, and sustainability considerations impact design
* Choose an idea to pursue based on success criteria and maintain an open mind about potentially viable ideas

Prototyping* Identify and apply **sources of inspiration**
* Choose a form for prototyping and develop a **plan** that includes key stages and resources
* Analyze the design for life cycle and evaluate its **impacts**
* Visualize and construct prototypes, making changes to tools, materials, and procedures as needed
* Record **iterations** of prototyping
 | *Students are expected to know the following:** simple metalworking and design
* orthographic and pictorial drawings
* **measuring instruments**
* **tables and charts** for tolerancing and machining
* operation and safety of **stationary** **power equipment** and **stationary** **non-power equipment** in the processing of material
* **size and lay out** of metal
* types of **metals and alloys** and their characteristics
* selection of metal type, size, structural shape, and finish for specific applications
* ferrous and non-ferrous metals and their applications
* **heat treatments**
* **welding and cutting**
* common **mechanical fastening methods**
* forging and foundry applications
* **design for the life cycle**
* ethics of **cultural appropriation** in design process
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**Learning Standards (continued)**

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| **Curricular Competencies** | **Content** |
| Testing* Identify and communicate with **sources of feedback**
* Develop an appropriate test of the prototype, conduct the test, and collect and compile data
* Apply information from critiques, testing results, and success criteria to make changes

Making* Identify appropriate tools, **technologies**, materials, processes, cost implications, and time needed
* Create design, incorporating feedback from self, others, and testing prototypes
* Use materials in ways that minimize waste

Sharing* Decide how and with whom to **share** product and processes for feedback
* Share the product to evaluate its success
* Critically reflect on their design thinking and processes, and identify new design goals
* Identify and analyze new design possibilities, including how they or others might build on their concept

Applied Skills* Apply safety procedures for themselves, co-workers, and users in both physical and digital environments
* Identify and assess the skills needed for design interests, individually or collaboratively, and develop specific plans to learn or refine them over time
* Develop competency and proficiency in skills at various levels involving manual dexterity and metalwork techniques

Applied Technologies* Explore existing, new, and emerging tools, technologies, and systems to evaluate suitability for design interests
* Evaluate impacts, including unintended negative consequences, of choices made about technology use
* Examine the role that advancing technologies play in metalworking contexts
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