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

**BIG IDEAS**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **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**

|  |  |
| --- | --- |
| **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 impacts, and possible unintended negative consequences
* Make decisions about premises and **constraints** that define the design space, and identify criteria for success
* Determine whether activity is collaborative or self-directed

Ideating* Critically analyze how competing social, ethical, and sustainability considerations impact creation and development of solutions
* Generate ideas to create a range of possibilities and add to others’ ideas in ways that create additional possibilities
* Choose an idea to pursue based on success criteria and maintain an open mind about potentially viable ideas
 | *Students are expected to know the following:** design for the life cycle
* history of manufacturing and production
* **product development** and **manufacturing processes**
* manufacturing to meet the needs of the end user
* **sustainable production**, upcycling, and **product life cycle**
* **mathematics** in engineering projects
* **measurement techniques** in engineering projects
* **physics** in engineering projects
* **static analysis** of structures
* use of **hand tools** and **power tools**
* **programming languages** for robotics and computer numerical control (CNC)
* methods of implementing **computer control**
* **technical communications**
* approaches to **innovative engineering projects**
* fundamentals of robotics and robotic manufacturing
* **modelling** and **simulation**
 |

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

**Learning Standards (continued)**

|  |  |
| --- | --- |
| **Curricular Competencies** | **Content** |
| Prototyping* Choose a form for prototyping and develop a **plan** that includes key stages and resources
* Analyze the design for the life cycle and evaluate its **impacts**
* Visualize and construct prototypes, making changes to tools, materials, and procedures as needed
* Record **iterations** of prototyping

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 results from testing of the prototype
* Use materials in ways that minimize waste

Sharing* Decide how and with whom to **share** creativity, or share and promote design and processes
* Share the product with users to evaluate its success
* Critically reflect on plans, products and processes, and identify new design goals
* Identify and analyze new possibilities for plans, products and processes, including how they or others might build on them

Applied Skills* Apply safety procedures for themselves, co-workers, and users in both physical and digital environments
 |  |

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

**Learning Standards (continued)**

|  |  |
| --- | --- |
| **Curricular Competencies** | **Content** |
| * Individually or collaboratively identify and assess skills needed for design interests
* Demonstrate competency and proficiency in skills at various levels involving manual dexterity
* Develop specific plans to learn or refine identified skills over time

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 multiple engineering contexts
 |  |