Course: Metalwork and Engineering 12

Teacher Name: Gordon Muter

Contact Information: gmuter@sd44.ca

Course Description:

In Metalwork and Engineering 12, students learn that design for the life cycle includes consideration of social and environmental impacts; that personal design interests require the evaluation and refinement of skills; and that tools and technologies can be adapted for specific purposes.

Metalwork and Engineering 12 is a design-challenge based course in which students design, draft and fabricate projects to solve problems. Metalwork and Engineering 12 students learn metalworking skills prior to designing, drafting and fabricating metal-based projects to solve problems. The following skill developing projects are typical: toolboxes, whistles, hammers, welded steel dice, slide whistles, coat racks, etc. The following design challenge projects are typical: towers, bridges, trebuchets, robotic arms, woodstoves, go-karts, etc. Students who have previously completed a senior engineering class are expected to choose their own projects and to be motivated to work in a self-directed manner. As well as practical skills, students learn transferable life-skills such as problem solving, work ethic, perseverance, and collaboration. Safety is emphasized in the use of power tools.

The overarching inquiry question of the course is “"How can we design and fabricate products to meet our needs?"

Course Expectations:

It is expected that students will:

- Abide by the student Code of Conduct
- Adhere to the Academic Honesty policy
- Respect themselves and others
- Attend every class and be punctual
- Inquire, think, and participate to the best of their individual ability
- Access technology in class for learning purposes only & only when instructed to do so
- Challenge themselves and have fun learning

Seycove Learning policies can be accessed at:
https://www.sd44.ca/school/seycove/About/agenda/Documents/Seycove%20Agenda%20Book%202018-2019%20(final).pdf

Learning Plan:

%	Evidence of Learning (Assessment)	Learning Plan
80%	Students will be assessed on the quality of production of their completed projects,	**What students will know:** design for the life cycle mathematics in advanced engineering projects measurement techniques in advanced engineering projects advanced static analysis of structures: • stress-strain analysis • stress analysis software non-destructive testing and destructive testing materials science: • metals and alloys (metallurgy) geometric dimensioning and tolerancing quality control methods physics in advanced engineering projects future career options and opportunities in engineering, including design, production, and emerging applications

	interpersonal and consultation skills for interacting with colleagues and clients
	What the students will do: **Applied Design** *Understanding context* • Engage in a period of user-centered 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 decisions about premises and constraints that define the design space, and develop criteria for success • Determine whether activity is collaborative or self-directed *Ideating* • Critically analyze how competing social, ethical, and sustainability considerations impact design • Generate ideas and add to others' ideas to create possibilities, and prioritize them for prototyping • Evaluate suitability of possibilities according to success criteria and constraints • Work with users throughout the design process

	Prototyping • Identify, critique, and use a variety of sources of inspiration • Choose an appropriate form, scale, and level of detail for prototyping, and plan procedures • 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 • Evaluate design according to 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 or promote design, creativity, and processes • Share the product with users and critically 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 skills needed for design interests, and develop specific plans to learn or refine them over time Demonstrate competency and proficiency in skills at various levels involving manual dexterity and complex woodworking techniques
20%	**Summative Assessment** Students' finished projects will be assessed for accuracy, and quality of fabrication.	
100%		