Course: Engineering 8

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Course Description:

In Engineering 8, students learn that design can be responsive to identified needs; that complex tasks require the acquisition of additional skills; and that complex tasks may require multiple tools and technologies.

In this hands-on, introductory engineering course, students design, draft and fabricate projects to solve problems. The following projects are typical: towers, bridges, sumo bots, rockets, etc. Projects begin with brainstorming, follow to design and drafting, and then fabrication. Final products are tested and evaluated in their ability to solve the specified problem. As well as practical woodworking skills, students practice transferable life-skills such as problem solving, work ethic, perseverance, hand-eye coordination, and following verbal instruction and demonstration.

The overarching inquiry question of the course is ""How can we design and fabricate products to solve problems?"

Course Expectations:
It is expected that students will:
- Abide by the student Code of Conduct
- Adhere to the Academic Honesty policy
- Respect yourself 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%20201 8-2019%20(final).pdf

Learning Plan:

%	Evidence of Learning (Assessment)	Learning Plan
100%	Students will be assessed on the quality of fabrication and tested success of their fabricated solutions to problems, at all stages, including brainstorming, drafting, prototypes and completed projects.	**What the students will know:** **Drafting** • drafting technique, including dimensioning and standards • drafting styles, including perspective, mechanical, and architectural **Power Technology** • energy transmission and applications • power technology hand tools • effects of forces on devices **Robotics** • mechanical devices for the transfer of mechanical energy • mechanical advantage and power efficiency, including friction, force, and torque **Woodwork** • identification, characteristics, properties, and uses of wood from various tree species • techniques for adjusting plans and drawings • woodworking techniques and traditional and non-traditional joinery using a variety of tools and equipment, including stationary power equipment **Metalwork** • range of uses of metalwork

- fabrication techniques and processes using hand tools and stationary equipment

What the students will do:

Making

Identify and use appropriate tools, technologies, and materials for production

Make a plan for production that includes key stages, and carry it out, making changes as needed

Use materials in ways that minimize waste

Demonstrate an awareness of precautionary and emergency safety procedures in both physical and digital environments

Identify and evaluate the skills and skill levels needed, individually or as a group, in relation to a specific task, and develop them as needed

Select, and as needed learn about, appropriate tools and technologies to extend their capability to complete a task

Identify the personal, social, and environmental impacts, including unintended negative consequences, of the choices they make about technology use

Identify how the land, natural resources, and culture influence the development and use of tools and technologies

What the students will understand:

Understanding context

- Engage in a period of research and empathetic observation in order to understand design opportunities

Defining

- Choose a design opportunity
- Identify potential users and relevant contextual factors
- Identify criteria for success, intended impact, and any constraints

Ideating

- Take creative risks in generating ideas and add to others' ideas in ways that enhance them
- Screen ideas against criteria and constraints
- Critically analyze and prioritize competing factors, including social, ethical, and sustainability considerations, to meet community needs for preferred futures
- Choose an idea to pursue, keeping other potentially viable ideas open

Prototyping

- Identify and use sources of inspiration and information
- Choose a form for prototyping and develop a plan that includes key stages and resources
- Evaluate a variety of materials for effective use and potential for reuse, recycling, and biodegradability
- Prototype, making changes to tools, materials, and procedures as needed
- Record iterations of prototyping

Testing

- Identify sources of feedback
- Develop an appropriate test of the prototype
- Conduct the test, collect and compile data, evaluate data, and decide on changes
- Iterate the prototype or abandon the design idea

Making

- Identify and use appropriate tools, technologies, materials, and processes for production
- Make a step-by-step plan for production and carry it out, making changes as needed
- Use materials in ways that minimize waste

Sharing

- Decide on how and with whom to share their product and processes
- Demonstrate their product to potential users, providing a rationale for the selected solution, modifications, and procedures, using appropriate terminology
- Critically evaluate the success of their product, and explain how their design ideas contribute to the individual, family, community, and/or environment
- Critically reflect on their design thinking and processes, and evaluate their ability to work effectively both as individuals and collaboratively in a group, including their ability to share and maintain an efficient co-operative work space
- Identify new design issues
- Demonstrate an awareness of precautionary and emergency safety procedures in both physical and digital environments
- Identify the skills and skill levels needed, individually or as a group, in relation to specific projects, and develop and refine them as needed
- Choose, adapt, and if necessary learn about appropriate tools and technologies to use for tasks
- Evaluate the personal, social, and environmental impacts, including unintended negative consequences, of the choices they make about technology use
- Evaluate how the land, natural resources, and culture influence the development and use of tools and technologies