

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
<p><i>Students are expected to be able to do the following:</i></p> <p>Applied Design</p> <p><i>Understanding context</i></p> <ul style="list-style-type: none"> Engage in a period of user-centred research and empathetic observation to understand design opportunities <p><i>Defining</i></p> <ul style="list-style-type: none"> Establish a point of view for a chosen design opportunity Identify potential users, intended impacts, and possible unintended negative consequences Make inferences about premises and constraints that define the design space, and develop criteria for success Determine whether activity is collaborative or self-directed <p><i>Ideating</i></p> <ul style="list-style-type: none"> Identify and examine gaps for potential design improvements and innovations 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 Evaluate suitability of possibilities according to success criteria, constraints, and potential gaps, and prioritize for prototyping Work with users throughout the design process 	<p><i>Students are expected to know the following:</i></p> <ul style="list-style-type: none"> historical background of remotely operated vehicles and recent developments uses of remotely operated vehicles (ROVs), remote control vehicles (RCVs), autonomous underwater vehicles (AUVs), and unmanned aerial vehicles (UAVs, also known as drones) factors affected by terrain for land-based vehicles underwater considerations for ROVs principles of flight control surfaces of an aircraft ethical, legal, and regulatory considerations tethered control navigation propulsion structure, sensors, and attachments radio-controlled (RC) communication operational planning from remote locations programming and coding

Learning Standards (continued)

Curricular Competencies	Content
<p>Prototyping</p> <ul style="list-style-type: none"> 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 <p>Testing</p> <ul style="list-style-type: none"> 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 <p>Making</p> <ul style="list-style-type: none"> 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 <p>Sharing</p> <ul style="list-style-type: none"> Decide how and with whom to share creativity, or share and promote design and processes Share the product with users and critically evaluate its success Critically reflect on plans, products and processes, and identify new design goals Evaluate new possibilities for plans, products and processes, including how they or others might build on them <p>Applied Skills</p> <ul style="list-style-type: none"> Apply safety procedures for themselves, co-workers, and users in both physical and digital environments Individually or collaboratively identify and assess skills needed for design interests 	<ul style="list-style-type: none"> emerging technologies design for the life cycle future career options and opportunities in UAV design, production, and emerging applications interpersonal and consultation skills for interacting with colleagues and clients

Learning Standards (continued)

Curricular Competencies	Content
<ul style="list-style-type: none"> • Demonstrate competency and proficiency in skills at various levels involving manual dexterity and complex mechanical, electrical, and electronic problems • Develop specific plans to learn or refine identified skills over time <p>Applied Technologies</p> <ul style="list-style-type: none"> • 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 • Analyze the role that changing technologies play pertaining to land, water, or air vehicles 	