School of Engineering

# Design Thinking Hub

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## Background

**Design Thinking** is not an exclusive attribute of engineers and designers. Genuinely great innovators in music, art, critical writing, science, and business have practiced and master it. So, why it is called Design Thinking? What is unique about Design Thinking is that the entire design thinking processes can help us formulate a methodology to extract, teach, learn and apply these human-centered skills and techniques to solve problems in a critical, creative and innovative way. Ironically, problem solving is a highly valued skills among employers. As a result, world class educational institutes are drifting from conventional theoretic knowledge base approach to a more applied based problem solving approach.

## Main Theme

This project will provide students from a variety of disciplines with experiential learning in design thinking, design manufacturing, and group design work. Students will be introduced to design and manufacturing as a process that is human-centered and relies on empathy, ideation, iteration, prototyping, and testing.

This project will develop blended learning modules that will provide students with the opportunity to obtain certificates (badges) that showcase their knowledge in the following areas:

- Design thinking (e.g. need finding, need scoping, ideation, and virtual design);
- Design prototyping and manufacturing (e.g. techniques for building and testing designs);
- Implementing design thinking and design prototyping in small groups inside or outside the classroom.

This certificate program will be available to all interested UBC Okanagan students beyond core curriculum requirements and badge 3 will also be integrated into several courses including APSC 171, APSC 169, APSC 258 and STEM education. In the future, the program could also be offered regionally as community outreach. The program will leverage existing maker spaces at the University of British Columbia, including: School of Engineering Maker Zone in STAR, EME 2220 and the Innovative Learning Classroom (EME 1123).

Through these spaces, the program will have access to emerging technologies such as 3D printers, CNC hotwire cutter, CNC rotor, laser cutter, 3D scanner as well as hands tools for 3D modelling/simulation.

## Project Details

The UBCO Thinking Design Hub program will create a number of tangible elements that will make substantial and meaningful contributions to the teaching, learning and research environment on campus. The primary tangible outcome of project will be a sustainable online and in-person platform that trains students from a variety of disciplines (e.g. Engineering, Educations and the Arts) to become competent with the design thinking process (**Badge 1**)

Also by completing these badges students learn:

- To apply design thinking to their projects, linking theoretical learning to real world contexts (**Badge 1**)
- To develop solutions to a well-defined problem (**Badge 1**)
- To develop virtual prototypes to a problem (Badge 1)
- To apply design prototyping and manufacturing skills (Badge 2)
- To select and use rapid prototyping skills (Badge 2)
- To create a physical prototype to solve a problem (Badge 2)
- To test and evaluate prototypes (Badge 2)
- To apply design thinking and prototyping skills in small group work (Badge 3)
- To use design thinking to work within the varied contexts of advance manufacturing (Badges 1,2, and 3)
- To apply their badges within specific courses within their program as well as add these badges to their CVs


**Figure 1. How to acquire Badge Zero (Safety) badges**

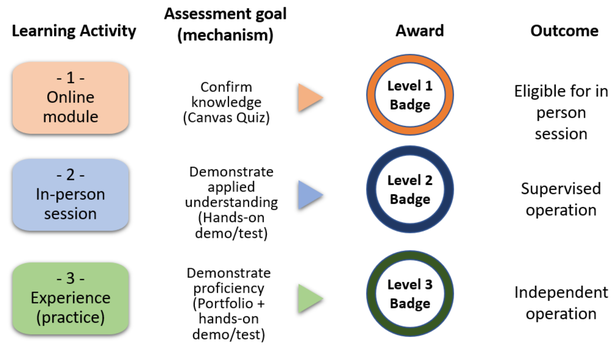


**Figure 2. Operations Badge Series Conceptual Overview**

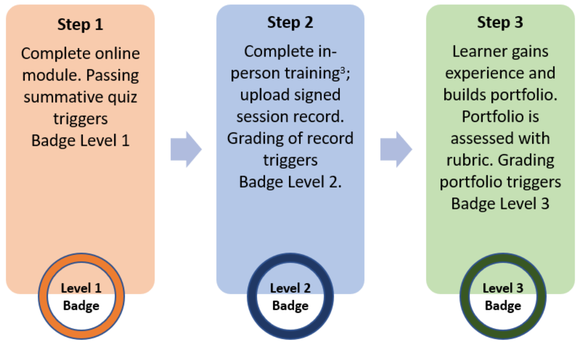


**Figure 3. Idealised Operations Badge-earning Process**

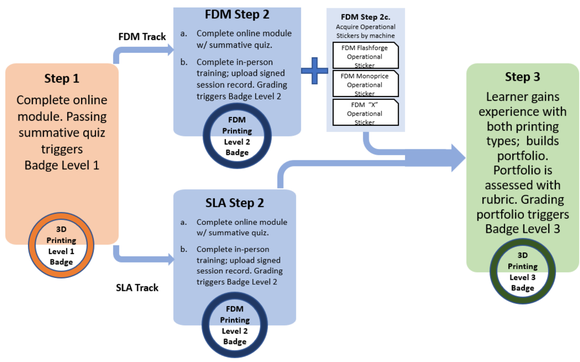


**Figure 6. Badge earning process for 3-D Printing**

*Note common Level 1 and 3 badges, differentiated at Level 2 to account for distinct method differences and multiple manufacturers.*

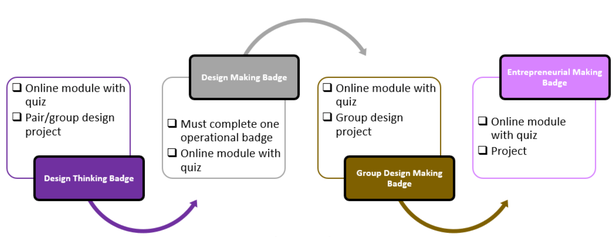


Figure 7. Maker Leaders Program

## Important Statistics

- 2,293 total number of badges awarded
- 1,383 unique students enrolled in the canvas module
- 862 individual users claimed all badges required (meaning in person visit and space use was confirmed)
- 15 students employed and trained in design thinking and maker equipment
- 6 young STEM workshops (2 student summer camps/year since 2019)
- 4 new badges in varying stages of production (to be implemented Sept 2022) including:
  1. makerspace 101- safety and design thinking
  2. 3D printing- additive manufacturing
  3. Electronics- introduction to soldering & microcontrollers
  4. makerspace design process coordinator – student staff onboarding module


Figure 6. Chart displaying intentional use of space outside of curriculum based requirements, demonstrating passion for the space

## Acknowledgement

*We gratefully acknowledge the financial support for this project provided by UBC Okanagan via the Aspire-2040 Learning Transformations Fund.*

*We also gratefully acknowledge the UBCO Makerspace Manger, Cortnee Chulo, for her contribution in this project.*

*Last but importantly, we would like to acknowledge UBCO Provost's office and Dr. Michelle Lamberson for their ongoing support.*

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