



# Thesis Projects (MIE498 H/Y) 2018–2019

## **Title/Topic:**

Classifying valid simulations during optimization for automated design using computational fluid dynamics models

## **Description:**

CFD simulations will fail to complete when geometry or mesh generation fails, or when the simulation solution does not converge. Handling these simulation failures is an important issue for practical optimization methods when using a CFD model in an automated optimization process. A model of simulation failure likelihood may be used to bias the optimization towards more useful designs and reduce the number of CFD simulations required by the optimization.

This project is part of our research into the optimization of small-scale hydro turbines. Its goal is to investigate a range of possible simulation failure models and incorporate these models into an existing Bayesian optimization method.

Possible pre-requisites: Some experience with CFD (ANSYS CFX), proficiency in computer programming (MATLAB, Python), previous courses on numerical methods, statistics, and/or optimization.

---

**Contact:** Prof. Amy Bilton | [bilton@mie.utoronto.ca](mailto:bilton@mie.utoronto.ca)