Faculty of Engineering
Summer Research Program 2023-2024

Project Title: Improving the pollution concentration and load estimation via innovative modelling approaches.

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Objective
In order to make a proper strategy to improve the water quality of the natural waterbodies such as rivers and bays, it is crucial to understand the pollutant load in the waterways. The existing approach with limited data collected each year from the selected sampling sites provided poor estimations. Therefore, the aim of this project is to using all the historical data to develop a modelling approach for the better estimation of stormwater pollution concentrations and loads.

Project Details
This project aims to develop a modeling approach that leverages historical data to estimate stormwater pollution concentrations and loads in natural water bodies like rivers. This project places a strong emphasis on data processing, model development, and model evaluation. The first step involves comprehensive data collection and compilation from various sources, ensuring data quality control and integration. Subsequently, data preprocessing techniques, including cleaning, outlier filtering, and handling missing values, are applied. Feature selection methods are then employed to identify relevant variables such as rainfall, land use, and pollutant sources that influence stormwater pollution. Multiple modeling approaches, such as regression models, machine learning algorithms, or hydrologic models, are considered for the development phase. Model parameters are carefully calibrated and validated using the compiled dataset, with special attention given to capturing temporal and spatial variability. Model performance is evaluated using error metrics and statistical tests, while sensitivity analysis helps identify influential factors. The developed model is implemented in a user-friendly software tool or web application, accompanied by interactive visualization tools for enhanced data exploration. The project concludes by highlighting the importance of continuous monitoring and data collection for model refinement and discussing potential future directions, including scaling up the approach to other regions or water bodies.

Prerequisites
CIV3285; If the student has not done CIV3285, an interview is required.

Additional Information
Student work on this project will be main focusing on the data-driven modelling research