The Department of Mathematical Sciences is pleased to offer the following research project for the summer of 2015. Interested students are urged to contact the faculty member(s) directing the project that most interests them. By contacting the faculty member, you can discover more about the project, learn what your responsibilities will be and, if possible, develop a timetable for the twelve-week research period.

PROJECT TITLE: Mathematical Modeling of Bacteria within a Water Distribution Network

Professor Benjamin Vaughan
Department of Mathematical Sciences
4111 French Hall West
Cincinnati, OH 45221-0025
Tel: (513) 556-4083
Fax: (513) 556-3417
Email: vaughabn@ucmail.uc.edu

Project Description

The availability of safe drinking water is an important requirement for modern society. In most industrialized nations, drinking water is delivered through advanced water distribution networks. These networks can be subject to contamination by harmful bacteria species, reducing the quality of the drinking water.

Mathematical modeling and analysis can be used to help us better understand the effect bacterial contamination has on drinking water distribution networks through useful predictions and insights. In this project, a student will gain experience developing mathematical models of the dynamics of bacteria introduced into a distribution network, including the interpretation of experimental data, as well as theoretical and computational methods that can used to predict the system's behavior.

The student working on this project should have background in Calculus and Differential Equations along with basic computer skills. Knowledge of Multivariable Calculus and Linear Algebra as well as some programming experience is not required but is a plus. Gaps in the student's knowledge would be addressed as the student progresses through the project.