Instructor Profile
Dr. Leigh Ann Samsa

Research Areas:
- Cell and molecular biology
- Organoid epithelial model system
- Stem cell technologies

Techniques:
Molecular cloning, CRISPR/Cas9 gene editing, PCR, qPCR, primary and immortalized cell culture, organoid culture systems, flow cytometry, FACS, microscopy.

Summer Research Projects:
Somatic stem cells perform the monumental job of renewing tissues within the confines of a fully developed organism. My research focuses on the genetic basis of intestinal stem cell (ISC) function. I am interested in exploring how ISCs detect and respond to environmental cues in order to maintain and modulate epithelial tissue composition in homeostasis and disease. To ask these questions, I apply genetic engineering and cell biology techniques to an organoid model of the intestinal epithelium. Intestinal organoids are 3D tissue mimetics grown from primary, non-transformed ISCs. They contain all the cell types found in the intestinal epithelium and represent a physiologically relevant, accessible and genetically tractable model of epithelial function.

This summer, I have two organoid project opportunities available to BIT SURE students. In the first project, students will apply a high throughput, genome-wide CRISPR/Cas9 screen to an existing organoid model of colon cancer. The goal of this project is to identify candidate genes involved in colon cancer. In the second project, students will generate and validate a stable organoid line that expresses a genetically encoded, fluorescent redox/ROS stress sensor. Redox/ROS stress is an important biochemical cue that is poorly understood in the context of the intestinal epithelium. Through these projects, students will develop skills in molecular cloning, genetic engineering, mammalian cell culture, stem cell biology, fluorescence microscopy and image analysis.