**Project Title**
Microsystems engineering for algal blooms

**Project Advisor**
Professor Mingming Wu - mw272@cornell.edu

**Project Area/Concentration**
Microfluidics, environmental biology

**Project Description**
The occurrence of harmful algal blooms (HABs) has been increasing due to nutrient enrichment of waters by the run-off from urban, agriculture and industrial development. HABs are caused by sudden growth of cyanobacteria, that secret toxins causing severe health problems and endangering aquatic systems. Current assays for studying HABs are large scale, experimental ponds or test tubes, they are not designed to study multiple environmental cues on the growth of cyanobacteria. As a result, there is limited understanding for the onset condition of HABs. This project will introduce students to use nano- micro- technology to study single cell growth under well-controlled complex environmental conditions. The goal of the project is to find a sustainable solution for the management of HABs. Students who have either microfabrication or microbiology background is strongly encouraged to apply.

**Possible Courses**
I select a set of courses together with students depending on the research project and students career goal. Everyone is different, and there is no one set of courses that fit all. In general, I emphasize the physical aspect of biological engineering including cellular engineering and bioinstrumentation.

Core:
BEE 7000: Orientation to graduate study
BEE 4550: Biologically inspired microsystems engineering
BME 6260: Optical microscopy
BEE 9900: Doctoral level research.

Optional and largely depend on student background
CS 1112: Intro computing using MATLAB
BEE 4500: Bioinstrumentation
BME 4390: Circuits signal and sensors
MAE 6680: Cancer for Engineers and Physicists
BME 3020: Molecular principles of biomedical engineering
BME 3110: Cellular systems biology