

**Biomedical Engineering Program  
School of Energy, Environmental, Biological, and Medical Engineering  
COLLEGE OF ENGINEERING AND APPLIED SCIENCE**

**SUMMER RESEARCH OPPORTUNITIES  
FOR UNDERGRADUATE WOMEN**

**APPLICATION DEADLINE: March 1, 2011**

*The School of Energy, Environmental, Biological, and Medical Engineering is pleased to offer the following research project for the summer of 2011. 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: Passive Cavitation Imaging for Monitoring of Therapeutic Ultrasound**

**Professor: T. Douglas Mast  
Biomedical Engineering Program  
3938 Cardiovascular Research Center  
Cincinnati, OH 45267-0586  
Tel: (513) 558-5609  
Fax: (513) 558-6102  
Email: doug.mast@uc.edu**

**Project Description**

The overall goal of this project is to develop the novel technology of passive cavitation imaging for guidance and control of therapeutic ultrasound, including thermal ablation (for cancer therapy) and ultrasound-enhanced drug delivery (penetration of drugs into or through the skin). In passive cavitation imaging, ultrasound-induced microbubble activity within tissue is mapped noninvasively from locally occurring acoustic emissions caused by cavitation and boiling. These acoustic emissions are detected passively by an ultrasound imaging array, filtered, and synthetically focused to form images depicting locations and strengths of stable cavitation, inertial cavitation, and tissue boiling throughout the imaged region. Preliminary data indicates that these passive cavitation images can accurately depict spatial profiles of therapeutic ultrasound beams, resolve individual sources of cavitation-induced acoustic emissions, and be used to predict local tissue temperature elevations.

In this project, the student will work with members of the Mast laboratory on experiments testing passive cavitation imaging for thermal ablation and drug delivery. Work will include design of experimental methods, procedures, and apparatus, performance of experiments, processing of ultrasound and tissue histology images, and data analysis.