Department of Biomedical, Chemical, and Environmental Engineering
COLLEGE OF ENGINEERING AND APPLIED SCIENCE

SUMMER RESEARCH OPPORTUNITIES
FOR UNDERGRADUATE WOMEN

APPLICATION DEADLINE: March 1, 2014

The Department of Biomedical, Chemical, and Environmental Engineering is pleased to offer the following research project for the summer of 2014. 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.

ECHO DECORRELATION IMAGING FOR GUIDANCE OF THERMAL ABLATION

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Project Description

A major goal of the Biomedical Acoustics Laboratory (BAL), directed by Dr. T. Douglas Mast, is to develop echo decorrelation imaging, an ultrasound-based method for the guidance of thermal ablation, including minimally invasive radiofrequency ablation and noninvasive high-intensity focused ultrasound (HIFU). Ultrasound echo decorrelation, which maps millisecond-scale, heat-induced changes in pulse-echo ultrasound signals, has the potential for real-time ablation guidance and control, thus improving the safety and efficacy of these ablation modalities. In a current NIH-funded project, we are assessing prediction of ablation-induced cell death by echo decorrelation imaging.

In this project, the mentee will assist in the preparation and execution of experiments employing custom image-treat ultrasound arrays and real-time echo decorrelation imaging during HIFU and bulk ultrasound thermal ablation of *ex vivo* bovine liver and *in vivo* VX2 liver cancer in rabbit rabbits. The mentee's primary responsibility will be designing, validating, and performing histologic tissue processing, vital staining, and image segmentation protocols for these *ex vivo* and *in vivo* echo decorrelation experiments. Design and validation of these protocols will allow accurate and precise performance assessment of echo decorrelation for real-time thermal ablation monitoring. The student will also collaborate on characterization of the image-treat arrays using a radiation force balance and a computer controlled 3-axis ultrasound calibration system. This project is suitable for a student with interest in biomedical, mechanical, or electrical engineering.