

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

**SUMMER RESEARCH OPPORTUNITIES
FOR UNDERGRADUATE WOMEN**

APPLICATION DEADLINE: March 1, 2012

The Biomedical Engineering Program is pleased to offer the following research project for the summer of 2012. 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: Mechanical Stimulation Effects on Tendon-Related Signaling Pathways in Tissue Engineered Constructs

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Project Description

Tendon and ligament injuries account for more than one-third of all treated musculoskeletal conditions with medical care costs exceeding \$57 billion annually. Current medical autograft and allograft techniques suffer from complications of donor site morbidity and disease transmission, respectively. Tissue engineers seek to create tissue replacements that improve the time of repair and restore normal tissue mechanics. Recent studies have shown that implanting mechanically stimulated tissue engineered constructs (TECs) seeded with bone marrow-derived progenitor cells (MPCs) show promise in delivering upon these objectives. To improve upon these repairs, we seek to activate tendon developmental pathways to promote the mechanical properties of our TECs and improve long-term tissue viability.

The WISE student will investigate how mechanical stimulation of TECs influences tendon-related developmental signaling pathways during TEC maturation in culture. Hands-on lab experience will allow the student to develop the following techniques: western blotting (protein expression), qPCR (gene expression), basic cell culture, and mechanical failure testing. The WISE student will also gain an understanding of experimental design, including developing research questions and testable hypotheses.