

**COLLEGE OF ENGINEERING
Biomedical Engineering**

**SUMMER RESEARCH OPPORTUNITIES
FOR UNDERGRADUATE WOMEN**

APPLICATION DEADLINE: March 1, 2006

The Department of Biomedical Engineering is pleased to offer the following research project for the summer of 2006. 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.

Designing Nanostructured Synthetic Biomaterials to Enhance Vascular Prosthesis Performance

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Significant advances have recently been made in the design, synthesis, and production of nanoscale materials for biological applications, but the translation of these promising technologies into high-impact medical treatments has yet to be realized. In the Collier Lab, we seek to contribute not only to the basic design and synthesis of novel nanostructured materials but also to the translation of these materials into tomorrow's medical treatments. In a 2006 Summer WISE program project, a student will have the opportunity to contribute to a project that aims to enhance the biocompatibility and functionality of vascular prosthetic grafts through the design of new synthetic materials that mimic native tissue structures found in healthy vessels. In normal, healthy vessels, the innermost surface of the vessel is composed of a single layer of endothelial cells (the intima) that resides on a complex network of proteins called the basement membrane. Synthetic vascular grafts lack this endothelial layer and are prone to thrombosis, dysregulation of underlying cells, and blockage because the endothelial layer is critically important in regulating these processes. Using peptide chemistry, we have designed synthetic materials that mimic a number of important cell-signaling motifs found in the native basement membrane, and we are evaluating these synthetic basement membranes as coatings to enhance the endothelialization of vascular grafts. A WISE student will have the opportunity to contribute to this project by investigating the most appropriate methods for integrating our coatings into existing vascular prosthesis materials such as expanded PTFE (Gore-Tex) and by investigating cell attachment and behavior under blood flow. The WISE student will learn cell culture, peptide chemistry, cell-matrix interactions, and biomaterials science, and will make a significant contribution to an important biomedical question.