DEPARTMENT OF MECHANICAL ENGINEERING
College of Engineering

SUMMER RESEARCH OPPORTUNITIES
FOR UNDERGRADUATE WOMEN

APPLICATION DEADLINE: MARCH 1, 2004

The Department of Mechanical Engineering is pleased to offer the following research project(s) for the summer of 2004. 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.

Mechanical Deformation of Biological Cells

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Mechanical deformation of biological cells are known to be important regulators of cell function. Deformations at the sub-cellular length scale play an important role in a variety of transport phenomena (e.g., stretch-sensitive ion channels), cell-to-cell adhesion and receptor-ligand interactions, and play an important role in overall cell structural integrity. Whole-cell length scale deformation play obvious roles in muscular contraction and cell division. So understanding the mechanics of living cells holds a critical place in the study of cell structure and function. The goal of this NSF-funded project is to derive improved models and experimental approaches for cell mechanical property identification. The experimental program employs atomic force microscopy (AFM) for cell (and other biomaterial) interrogation, with a variety of software tools in place for data processing. The WISE program would support a detailed material study in AFM volume mode, in which an elasticity map would be derived for an entire surface using the newly-derived models. The project is 80% experimental, using the AFM facilities in the Vontz center or in the College of Engineering. The remaining 20% involves numerical work of data processing and material property extraction. The WISE student will be mentored by one primary faculty member (Dr. E. Berger from the College of Engineering), one research faculty member from the College of Medicine (Dr. H. You), and two experienced graduate students currently working on the project.