

**Chemical and Materials Engineering  
COLLEGE OF ENGINEERING**

**SUMMER RESEARCH OPPORTUNITIES  
FOR UNDERGRADUATE WOMEN**

**APPLICATION DEADLINE: March 1, 2006**

*The Department of Chemical & Materials 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.*

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Membrane microfiltration is currently used for clarification and sterile filtration of many pharmaceutical and biotechnology products. One of the critical factors governing the overall performance of these processes is the irreversible alteration in the membrane caused by protein fouling. Previous studies of protein fouling have generally employed one of the classical fouling models: pore blockage, pore constriction, or cake filtration. We have developed a combined pore blockage and cake filtration model that was able to accurately describe the rate of flux decline for various membranes and proteins, with the model parameters for each of these systems directly related to the physical properties of the protein solutions.

The student will collect data for the filtrate flux and protein concentration in the filtrate under different solution conditions (e.g., pH and salt concentration). He or she will then apply the newly developed pore blockage and cake filtration model to analyze membrane fouling and correlate the model parameters to the property of the protein solution. The student will gain extensive experience in membrane systems and protein separations. He or she will obtain an ideal background in the underlying scientific and engineering fundamentals required for developing effective separation processes in the biotech and pharmaceutical industries.