

September 1, 2006

## NSF Awards "Biofilms: The Hypertextbook"

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The National Science Foundation has awarded Montana State University's Center for Biofilm Engineering a \$498,270 grant to develop a web-based undergraduate teaching and active-learning resource about biofilms. The grant begins September 1, 2006 and expires August 31, 2009.

### NSF Abstract

*Biofilms: The Hypertextbook* is a teaching and learning resource constructed around Web technologies that can be disseminated on DVD media. Materials are presented in parallel in distinct forms for students at different academic levels (from freshman to seniors). In addition to standard textual presentations of a subject, the hypertextbook incorporates high resolution images, slide shows, videos, audio, and active learning models of important processes that require student interaction—all interwoven into a seamless presentation. The team creating *Biofilms: The Hypertextbook* includes content specialists, computer scientists, educational evaluators, graphics and web design specialists, and copy editors. The material is presented in a form facilitating use by a variety of disciplines (e.g. microbiology, environmental science, and various engineering sub-disciplines) and for different lengths of treatment (from a few lectures to an entire course). It is undergoing extensive evaluation to determine its acceptability by students and its ease of use by them, its attractiveness to faculty as a means of supporting their classroom efforts, and the rate at which it is disseminated and adopted. A prototype of the hypertextbook has been formally evaluated and the results of that evaluation are guiding this further development.

**Intellectual Merit:** Biofilms has emerged as a discipline within a variety of fields as research reveals that microorganisms on surfaces generally live in heterogeneous colonies with inherent defense mechanisms and other characteristics not found in those same microorganisms in aqueous solution. This rapid change in approach to understanding the ecology of microbes and their effects on a variety of related organisms (including humans) is radically changing our view of microbiology and profoundly affecting practice and research in academia, industry, medicine, and dentistry. The hypertextbook being produced within this project is helping faculty keep their course content current with these research advances within the science and the pedagogy current with advances in science education.

**Broader Impacts:** The hypertextbook is being made widely and generally available in incremental fashion as it evolves during the course of the project. It is being disseminated to and evaluated in STEM courses at a variety of institutions (from community colleges to R1 research universities) with diverse student populations (e.g., the Montana Tribal Colleges and other largely minority serving schools), and wide geographic representation. In addition to encouraging and facilitating the introduction of biofilm topics into the STEM curricula, the project is also exploring the general concept of the hypertextbook and is providing the first large-scale examination of the effects of the hypertextbook on student learning.

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**Project Title:** Biofilms: The Hypertextbook--A Web-Based Active-Learning Approach for Rapid Infusion of Emerging Knowledge into Undergraduate STEM Curricula

**Funded by:** NSF Department of Undergraduate Education

**Start Date:** September 1, 2006

**Expires:** August 31, 2009 (estimated)

**Award Amt:** \$498,270

### Investigators:

Alfred Cunningham (PI); Rockford Ross (Co-PI); Philip Stewart (Co-PI); Anne Camper (Co-PI)