

3. Project Summary:

Traditional microbiology laboratory courses use defined culture media and culture-based tests to identify common, known microorganisms. Molecular applications to this field have both accelerated diagnostic methods and demonstrated the limitations of selective, culture-dependent approaches. We have developed an inquiry- and research-driven curriculum for our majors core course in general microbiology. For the first seven weeks of this curriculum, students will use isolate, enumerate, and characterize target environmental bacteria from four local soil and water habitats using both culture-driven and molecular fluorescent approaches. Using proposed new curricula and technology, they will hybridize fixed preparations of their samples and isolates with fluorescent-labeled bacterial genus-specific DNA probes in an effort to enumerate and identify samples and sample members. During the final three weeks of this curriculum, students will determine and computer-analyze the DNA sequence of cloned bacterial genes that were isolated from Yellowstone hot springs known to contain new, uncultured thermophiles. During the entire term, students will document all project methods and results, producing on-line project web-pages that will aid them in commonly sought career paths (teaching, health science, and biotechnology). Class-based images will be used for new assessment purposes during new on-line practical lab exams. Additional evaluation tools will be developed to assess this curriculum over a period of two years.