

BIO 2321 Microbiology lab - Dr. Julie Zwiesler-Vollick and Dr. Fauzia Siddiq

Microbiology lab is a required laboratory for molecular and cell biology students. It is also the only natural science laboratory required by nursing students, and is recommended for their first year. As such, it provides a unique opportunity to provide an authentic research experience to many students unlikely to have encountered natural science research previously. In this course, students are asked to investigate the impact of human activity on the soil microbiome while still learning the basic skills of aseptic technique, microbial staining, and biochemical characterization.

In the first three weeks of the course, students are introduced to the use of the light microscope to examine microbial smears, the application of microbial stains, the microbial dilution technique of streaking, and good lab safety practices and aseptic technique. In the fourth week, students are reminded of the various environmental factors which can influence microbial growth. They are shown data about the application of road salt in the continental U.S. and its impact on rivers and streams. They are told that little is known about the impact on microbes. As a lab pair, they are asked to choose a spot to isolate a soil sample and to predict whether they will find halotolerant microbes (based on proximity to salt application). Students bring soil samples to lab and follow an established protocol to extract microbes from the soil sample. They then serially dilute their sample and plate their microbes in parallel on both nutrient agar and nutrient agar with 5% sodium chloride. The number of colonies at a specific dilution are then compared and used to calculate the percentage of microbes which were halotolerant. Students then select a halotolerant microbe to continue to characterize throughout the rest of the semester. They use stains, selective media, differential media and a variety of biochemical tests to learn more about their microbe. They also extract DNA from their microbe and use the polymerase chain reaction to amplify the rDNA region of the genome. This DNA is then purified and sequenced. The DNA sequence is compared to a database to provide a possible identification for the genus and species of the microbe. Students prepare a poster which describes this project and present it to the rest of the class. This CURE module reinforces the basic microbial techniques but also allows students to participate in a research exercise.