

TABLE 2
Intended Learning Outcomes

Skills: Students will gain the ability to
<ul style="list-style-type: none"> ▶ Conduct scientific research, starting with well-defined protocols and progressing to open-ended research projects ▶ Define a biodegradation research question, then plan and carry out an experiment to address this question ▶ Engage in engineering design, including planning, constructing and testing a device, assessing cost, and then presenting and critiquing the results with fellow students ▶ Work collaboratively to design experiments or engineering designs, interpret results, and critically analyze ideas and conclusions ▶ Analyze data and draw conclusions about the research or design results ▶ Write a concise and accurate summary of methods, results, and conclusions ▶ Engage in peer review to exchange constructive criticism of data analysis, interpretations, and conclusions ▶ Use feedback from fellow students to revise or justify reports and presentations
Concepts: Students will gain the understanding that
<ul style="list-style-type: none"> ▶ Life on Earth depends on cycling of carbon and other nutrients, and on flow of energy from the Sun to producers, consumers, and decomposers ▶ Bacteria and fungi play essential roles in nutrient cycling and energy flow on land and in water ▶ Decomposers play crucial but often hidden roles in food webs and energy pyramids ▶ Through photosynthesis, producers use solar energy, CO₂, and water to create food in the form of chemical energy. Consumers, including decomposers, obtain energy by eating other organisms or their wastes ▶ Through cellular respiration, living things use the chemical energy stored in organic compounds, releasing CO₂, water, and heat as by-products ▶ Humans harness natural forces of decay in order to protect or clean up the environment through composting, wastewater treatment, and bioremediation ▶ Science is multidisciplinary and relevant to societal concerns ▶ Scientists and engineers work both individually and collaboratively, reviewing each other's work to provide feedback on experimental design and interpretation of results ▶ Scientific understandings are tentative, subject to change with new discoveries. Peer review among scientists helps to sort genuine discoveries from incomplete or faulty work