Environmental Sustainability TEKS/LINKS – Student Objectives One Credit	Suggested Time Ranges
First Six Weeks	
Water Security	
ES 1(A) The student will understand that food insecurity, a lack of clean water, and the need for renewable energy sources are major global problems affecting millions of people worldwide. ES 1(B) The student will understand an engineering design process involves a characteristic set of practices and steps used to develop innovative solutions to problems. ES 1(C) The student will understand engineers create new products or improve existing products and technology to meet human needs and wants. ES 1(D) The student will understand engineers must consider ethical concerns when making decisions on environmental sustainability solutions.	9 days
Drinking Water ES 1(A) The student will understand that clean drinking water is the most fundamental necessity for life. ES 1(B) The student will understand that the availability of pure drinking water represents one of the most pressing global challenges with more than a billion people worldwide lacking access to safe drinking water. ES 1(C) The student will understand that Fresh water suitable for human consumption represents less than 1 percent of all the water on Earth.	11 days
Contaminated Water ES 1(A) The student will understand that portable water most commonly comes from surface or groundwater sources. ES 1(B) The student will understand that water can be contaminated by a wide variety of chemicals and biological agents that have health implications for humans and animals. ES 1(C) The student will understand that water contaminants can be tested for by using specific chemical and biological assays.	8 days
Second Six Weeks	
Water Security	
Clean Up ES 1(A) The student will understand that a variety of different biological organisms can be used to clean up contaminated ecosystems. ES 1(B) The student will understand that water treatment involves a combination of physical, chemical, and biological processes that are tailored to the conditions of the water to be treated and the level of post-treatment purity needed. ES 1(C) The student will understand that engineering plays an important role	5 days

Environmental Sustainability TEKS/LINKS – Student Objectives One Credit	Suggested Time Ranges
in providing clean, safe drinking water for all. ES 1(D) The student will understand that systematic scientific experimentation methods can be used to test operational prototypes.	
World Problems ES 1(A) The student will understand that water treatment involves a combination of physical, chemical, and biological processes that are tailored to the conditions of the water to be treated and the level of post-treatment purity needed. ES 1(B) The student will understand that worldwide water problems can be solved through the collaborative efforts of engineers and scientists. ES 1(C) The student will understand that an engineering design process involves a characteristic set of practices and steps used to develop innovative solutions to problems. ES 1(D) The student will understand that there is more than one way to look at a problem and often many possible solutions.	8 days
World Feeding ES 1(A) The student will understand that the world faces significant challenges that can be addressed via the combined efforts of scientists and engineers. ES 1(B) The student will understand that engineers create new products or improve existing products and technology to meet human needs and wants. ES 1(C) The student will understand that engineers are challenged with feeding a growing world population, providing sustainable, affordable energy to fulfill daily needs, providing clean drinking water, while also protecting the environment. ES 1(D) The student will understand that engineers need to meet the rising global demand for food in ways that are environmentally, socially, and economically sustainable in the face of an evolving global climate and reduced viable agricultural land.	12 days
Third Six Weeks	
Food Security	
DNA ES 1(A) The student will understand that organisms can be improved or changed in the laboratory through the manipulation of genes. ES 1(B) The student will understand that technical professionals clearly and accurately document and report their work using technical writing practice in multiple forms. ES 1(C) The student will understand that DNA is the genetic material of all living organisms that encodes biological information. ES 1(D) The student will understand that DNA from all living organisms has	18 days

Environmental Sustainability TEKS/LINKS – Student Objectives One Credit	Suggested Time Ranges
the same basic structure—the differences are in the sequences of the nucleotides. ES 1(E) The student will understand that proteins are produced through the processes of transcription and translation. ES 1(F) The student will understand that molecular biology techniques can be used to determine whether an organism contains a specific DNA sequence. ES 1(G) The student will understand that gel electrophoresis separates DNA fragments based on size.	
Genetic Organism ES 1(A) The student will understand that technical professionals clearly and accurately document and report their work using technical writing practice in multiple forms. ES 1(B) The student will understand that a variety of different techniques can be used to develop transgenic organisms. ES 1(C) The student will understand that genes from one organism can be inserted into another organism through genetic recombination processes. ES 1(D) The student will understand that plasmids, circular rings of DNA, can be used to assemble recombinant DNA and to clone a gene of interest.	7 days
Fourth Six Weeks	
Renewable Fuels	
Bioengineer ES 1(A) The student will understand that technical professionals clearly and accurately document and report their work using technical writing practice in multiple forms. ES 1(B) The student will understand that bioengineers need to meet the rising global demand for food in ways that are environmentally, socially, and economically sustainable in the face of an evolving global climate and reduced viable agricultural land. ES 1(C) The student will understand that the design process is a step-by-step method used to guide people in developing solutions to problems. ES 1(D) The student will understand that bioengineers need to consider all of the expected outcomes and unintended consequences when designing solutions to problems. ES 1(E) The student will understand that agricultural biotechnology involves trade-offs between increased production, environmental harm, and social values. ES 1(F) The student will understand that ethical issues surround the development and use of transgenic organisms. (Optional)	33 days

Environmental Sustainability TEKS/LINKS – Student Objectives One Credit	Suggested Time Ranges
Fifth Six Weeks	
Renewable Fuels	
ES 1(A) The student will understand that other sources of energy, in addition to fossil fuels, can be used to power human activities. ES 1(B) The student will understand that photosynthetic organisms capture and store energy for use in biological processes. ES 1(C) The student will understand that there are negative environmental consequences resulting from every type of energy produced and used by humans. ES 1(D) The student will understand that digital sampling instruments of various types can be used to collect data during laboratory experiments, for monitoring of biomanufacturing plant operations, as well as for long-term monitoring of the environment. ES 1(E) The student will understand that models and simulations, based upon real data and mathematics, can be used to represent systems and as a tool to predict a range of possible future conditions. ES 1(F) The student will understand that humans use various types of energy to help support their lives.	16 days
Biofuel ES 1(A) The student will understand that algae are a diverse group of unicellular photosynthetic organisms that produce a wide variety of metabolic products that can be used as a fuel source as well as for many other uses. ES 1(B) The student will understand how to grow algae as a significant source of biofuels has great potential, but it is a newly emerging industry that has many scientific, technical, and engineering challenges that need to be solved. ES 1(C) The student will understand that an engineering design process involves a characteristic set of practices and steps used to develop innovative solutions to problems. ES 1(D) The student will understand that science, engineering, and technology are interdependent. ES 1(E) The student will understand that there is more than one way to look at a problem and often many possible solutions. ES 1(F) The student will understand that the experimental method is a systematic and objective process for investigating, quantifying, and answering specific questions.	16 days

Environmental Sustainability TEKS/LINKS – Student Objectives One Credit	Suggested Time Ranges
Sixth Six Weeks	
Renewable Fuels	
Biomanufacturing ES 1(A) The student will understand that there are negative and positive effects of producing biofuels from biological feed stocks. ES 1(B) The student will understand that the biomanufacturing processes for separating and purifying a desired product are open and involve a series of methodical steps and informed decisions. ES 1(C) The student will understand that enzymes function to promote more efficient chemical reactions. ES 1(D) The student will understand that ethanol can be produced from a variety of renewable sources. ES 1(E) The student will understand that the experimental method is a systematic and objective process for investigating, quantifying, and answering specific questions. ES 1(F) The student will understand that an engineering design process involves a characteristic set of practices and steps used to develop innovative solutions to problems.	16 days
Commercialization ES 1(A) The student will understand that Commercialization of a biotechnology product involves the application of biological science and engineering design. ES 1(B) The student will understand that Design, development, and operation of a commercial biomanufacturing plant involves the combined efforts of experts in science, engineering, and business. ES 1(C) The student will understand that Life cycle analysis is a systematic methodology for examining and evaluating all inputs and outputs for a given biomanufacturing system.	16 days