EGG HARBOR TOWNSHIP PUBLIC SCHOOLS
CURRICULUM

CP Sustainability
High School

Length of Course:	Full Year
Elective / Required:	Refer to Program of Studies
Schools:	High School
Student Eligibility:	Grade 12
Credit Value:	5 credits
Date Submitted:	September 2016
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DISTRICT MISSION STATEMENT

Our mission in the Egg Harbor Township School District is to partner with the student, family, school, and community to provide a safe learning environment that addresses rigorous and relevant 21st Century standards and best practices which will develop academic scholarship, integrity, leadership, citizenship, and the unique learning style of students, while encouraging them to develop a strong work ethic and to act responsibly in their school community and every day society.

SCIENCE – PHILOSOPHY

We believe that ALL students regardless of race, ethnicity, socio-economic status, religious background, and/or any other classification are deserving of a holistic science education. This holistic approach would include an education that will allow them to fully discover themselves, their strengths and weaknesses, and benefit from science instruction.

> Scientific literacy assumes an increasingly important role in the context of globalization. The rapid pace of technological advances, access to an unprecedented wealth of information, and the pervasive impact of science and technology on day-to-day living require a depth of understanding that can be enhanced through quality science education. In the 21st century, science education focuses on the practices of science that lead to a greater understanding of the growing body of scientific knowledge that is required of citizens in an ever-changing world (NJCCCS-Science).

Science curricula are designed to reinforce 21st Century Learning, to maximize rigor, relevance, and relationships, and to engage students individually through differentiated instruction.

SCIENCE - STATEMENT OF PURPOSE

Education exists for the purpose of enabling each individual to realize and maintain her/his full potential. Scientifically literate students possess the knowledge and understanding of scientific concepts and processes required for personal decision-making, participation in civic and cultural affairs, and economic productivity.

> Science, engineering, and technology influence and permeate every aspect of modern life. Some knowledge of science and engineering is required to engage with the major public policy issues of today as well as to make informed everyday decisions, such as selecting among alternative medical treatments or determining how to invest public funds for water supply options. In addition, understanding science and the extraordinary insights it has produced can be

> meaningful and relevant on a personal level, opening new worlds to explore and offering lifelong opportunities for enriching people's lives. In these contexts, learning science is important for everyone, even those who eventually choose careers in fields other than science or engineering (NJSLS-Science)
>
> All students engage in science experiences that promote the ability to ask, find, or determine answers to questions derived from natural curiosity about everyday things and occurrences. The underpinning of the revised standards lies in the premise that science is experienced as an active process in which inquiry is central to learning and in which students engage in observation, inference, and experimentation on an ongoing basis, rather than as an isolated a process. When engaging in inquiry, students describe objects and events, ask questions, construct explanations, test those explanations against current scientific knowledge, and communicate their ideas to others in their community and around the world. They actively develop their understanding of science by identifying their assumptions, using critical and logical thinking, and considering alternative explanations (NJCCCS-Science).

Our school district provides an extensive science program, which will enable students to succeed and compete in the global marketplace using the New Jersey Student Learning Standards in Science as well as the Next Generation Science Standards.

INTRODUCTION

The most precious resource teachers have is time. Regardless of how much time a course is scheduled for, it is never enough to accomplish all that one would like. Therefore, it is imperative that teachers utilize the time they have wisely in order to maximize the potential for all students to achieve the desired learning.

High quality educational programs are characterized by clearly stated goals for student learning, teachers who are well-informed and skilled in enabling students to reach those goals, program designs that allow for continuous growth over the span of years of instruction, and ways of measuring whether students are achieving program goals.

THE EGG HARBOR TOWNSHIP SCHOOL DISTRICT CURRICULUM TEMPLATE

The Egg Harbor Township School District has embraced the backward-design model as the foundation for all curriculum development for the educational program. When reviewing curriculum documents and the Egg Harbor Township curriculum template, aspects of the backward-design model will be found in the stated enduring *understandings/essential questions, unit assessments,* and *instructional activities*. Familiarization with backward-design is critical to working effectively with Egg Harbor Township's curriculum guides.

GUIDING PRINCIPLES: WHAT IS BACKWARD DESIGN?
WHAT IS UNDERSTANDING BY DESIGN?

"Backward design" is an increasingly common approach to planning curriculum and instruction. As its name implies, "backward design" is based on defining clear goals, providing acceptable evidence of having achieved those goals, and then working 'backward' to identify what actions need to be taken that will ensure that the gap between the current status and the desired status is closed.

Building on the concept of backward design, Grant Wiggins and Jay McTighe (2005) have developed a structured approach to planning programs, curriculum, and instructional units. Their model asks educators to state goals; identify deep understandings, pose essential questions, and specify clear evidence that goals, understandings, and core learning have been achieved.

Programs based on backward design use desired results to drive decisions. With this design, there are questions to consider, such as: What should students understand, know, and be able to do? What does it look like to meet those goals? What kind of program will result in the outcomes stated? How will we know students have achieved that result? What other kinds of evidence will tell us that we have a quality program? These questions apply regardless of whether they are goals in program planning or classroom instruction.

The backward design process involves three interrelated stages for developing an entire curriculum or a single unit of instruction. The relationship from planning to curriculum design, development, and implementation hinges upon the integration of the following three stages.

Stage I: Identifying Desired Results: Enduring understandings, essential questions, knowledge and skills need to be woven into curriculum publications, documents, standards, and scope and sequence materials. Enduring understandings identify the "big ideas" that students will grapple with during the course of the unit. Essential questions provide a unifying focus for the unit and students should be able to answer more deeply and fully these questions as they proceed through the unit. Knowledge and skills are the *"stuff"* upon which the understandings are built.

Stage II: Determining Acceptable Evidence: Varied types of evidence are specified to ensure that students demonstrate attainment of desired results. While discrete knowledge assessments (e.g.: multiple choice, fill-in-the-blank, short answer, etc…) will be utilized during an instructional unit, the overall unit assessment is performance-based and asks students to demonstrate that they have mastered the desired understandings. These culminating (summative) assessments are authentic tasks that students would likely encounter in the real-world after they leave school. They allow students to demonstrate all that they have learned and can do. To demonstrate their

understandings students can explain, interpret, apply, provide critical and insightful points of view, show empathy and/or evidence self-knowledge. Models of student performance and clearly defined criteria (i.e.: rubrics) are provided to all students in advance of starting work on the unit task.

Stage III: Designing Learning Activities: Instructional tasks, activities, and experiences are aligned with stages one and two so that the desired results are obtained based on the identified evidence or assessment tasks. Instructional activities and strategies are considered only once stages one and two have been clearly explicated. Therefore, congruence among all three stages can be ensured and teachers can make wise instructional choices.

At the curricular level, these three stages are best realized as a fusion of research, best practices, shared and sustained inquiry, consensus building, and initiative that involves all stakeholders. In this design, administrators are instructional leaders who enable the alignment between the curriculum and other key initiatives in their district or schools. These leaders demonstrate a clear purpose and direction for the curriculum within their school or district by providing support for implementation, opportunities for revision through sustained and consistent professional development, initiating action research activities, and collecting and evaluating materials to ensure alignment with the desired results. Intrinsic to the success of curriculum is to show how it aligns with the overarching goals of the district, how the document relates to district, state, or national standards, what a high quality educational program looks like, and what excellent teaching and learning looks like. Within education, success of the educational program is realized through this blend of commitment and organizational direction.

INTENT OF THE GUIDE

This guide is intended to provide teachers with course objectives and possible activities, as well as assist the teacher in planning and delivering instruction in accordance with the New Jersey Core Curriculum Content Standards. The guide is not intended to restrict or limit the teacher's resources or individual instruction techniques. It is expected that the teacher will reflectively adjust and modify instruction and units during the course of normal lessons depending on the varying needs of the class, provided such modified instruction attends to the objectives and essential questions outlined below.

N.J.A.C. 6A:8-3.1 Required Curriculum Components

Code Language	Evident in Curriculum YES/NO	Comments
Interdisciplinary Connections	**Yes**	**Via lab activities. STEM units in development 1 per marking period**
A pacing guide	**Yes**	**By Unit approximately 2-4 units per marking period**
A list of core instructional materials, including various levels of text at each grade level	**Yes**	**Suggested Activities Labs**
Benchmark assessments	**Yes**	**Teacher-developed and common via pre/post and benchmark assessments**
Modifications for special education students, for ELLs in accordance with N.J.A.C. 6A:15, and for gifted students. (As appropriate) – See Appendix A	**Yes**	**As directed by student's Individual Education Plan**

Unit Name: Food Production Time Frame: 11 weeks

Author: Egg Harbor Township High School Science Department

UNIT

Subject: **Science** Country: **USA**

Course/Grade: **College Prep Sustainability/ 12** State/Group: **NJ**

School: **Egg Harbor Township High School**

UNIT SUMMARY- The purpose of this unit is to familiarize the students with problems that arise with food production due to a growing human population.

UNIT RESOURCES-Project Based Activities

Internet Resource Links: Google and other search engines

STAGE ONE

GOALS AND STANDARDS-

HS-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

HS-ETS1-2 Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

HS-ETS1-4 Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

HS-ESS3-4 Evaluate or refine a technological solution that reduces impacts of human activities on natural systems

HS-ETS1-3 Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.

The goal of this unit is for the students to realize that there are many factors that affect food production as well as to set up their own sustainable crop system.

ENDURING UNDERSTANDINGS

The big idea for this unit is how the human population is affected by food security. The students will gain knowledge on how to best grow a type of crop as well as determine why biodiversity is so important. The misunderstanding coming into class may be that there is no current problem with food production.

ESSENTIAL QUESTIONS

1. How can our food availability become more secure as the population grows?

KNOWLEDGE AND SKILLS

Content: Vocabulary- selective breeding, biodiversity, genetically modified

Skills:

- **Complete a biodiversity study on our school**
- **Test soil to determine which type of soil is most productive**
- **Determine agricultural resources**

STAGE TWO

PERFORMANCE TASKS

- **TopSoil Tour- the students will work in groups to determine what factors are needed in order to make soil fertile**
- **Soil Productivity Kit- The students will bring samples in from around the school and determine what makes soil productive. They will test a variety of factors including nitrogen and phosphorous amounts.**
- **Exploring Biodiversity- The students will complete a study of the school grounds looking specifically at how diverse of an ecosystem is outside by the WHIP Garden.**
- **Stream Macroinvertebrate- The students will collect various insects from around the pond and how the amount of insects can be used as an indicator of how stable an ecosystem is**
- **Loss of Biodiversity- The students will see what happens when biodiversity is lost in an ecosystem and how this makes an ecosystem unstable.**
- **Seed Challenge- The students will be growing seeds and looking at what factors affect the growing rate of plants and how they will also look at genetically modified plants and how they are beneficial to our global food supply**
- **Determining Agricultural Resources- The students will look at what resources are needed in order to grow a lot of food quickly and how this affects the overall global food supply.**

OTHER EVIDENCE

- **Complete Lab Summaries**
- **Feeding a Growing Human Population- The students will use everything that they have learned so far in this marking period to determine what factors affect the global food supply the most and how this can be remedied in the future**

STAGE THREE

LEARNING PLAN

The students will complete activities in groups and they will also complete lab summaries. They will focusing on a project based curriculum. They will also do research in the computer lab focusing on the current trends in sustainability.

Unit Name: Resource Management **Time Frame: 10 weeks**

Author: Egg Harbor Township High School Science Department

UNIT

Subject: **Science** Country: **USA**

Course/Grade: **College Prep Sustainability/12** State/Group: **NJ**

School: **Egg Harbor Township High School**

UNIT SUMMARY- The purpose of this unit is to understand how resources can be managed to be more sustainable for a growing human population.

UNIT RESOURCES- Project Based Activities

Internet Resource Links: Google and other search engines

STAGE ONE

GOALS AND STANDARDS-

HT-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants

HS-ETS1-2 Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

HS-ESS3-1 Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity

HS-ESS3-5 Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems

HS-ETS1-3 Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.

HS-ESS3-2 Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios

The goal of this unit is for the students to look at different ways that a variety of resources can be conserved.

ENDURING UNDERSTANDINGS

The big idea for this unit is that the human population depends on resources from the environment. The misunderstanding coming into class is that the resources available are unlimited. In actuality the resources are very limited and must be used sustainably.

ESSENTIAL QUESTIONS

1. What resources must be conserved and how can humans accomplish this task?

KNOWLEDGE AND SKILLS

Content: Vocabulary- Mining, Coastline

Skills:

Students will research sustainable fishing

Students will determine how coastlines will change in the future

Students will complete group activities showing why resources must be conserved.

STAGE TWO

PERFORMANCE TASKS

- **The Cost of Cool- The students will watch a short video on how dependent as a society we are on new products and how this affects the environment. The students will then discuss what they learned from the video**
- **Mining for Minerals- The students will complete an activity on how we currently mine for minerals and how this has a detrimental effect on the environment.**
- **Indigo Dye Lab- The students will look at the simple process of dying clothes different colors and how this has a huge effect on the environment.**
- **Polymers- The students will look at what exactly a hydrocarbon is and what the properties are of hydrocarbons. This will then be used in the next unit when we discuss energy.**
- **Resource Sustainability and Conserving Resources- The students will realize that our resources are not unlimited. They will review and adapt ways to make our resources last.**

OTHER EVIDENCE

Complete Lab Summaries

Ocean Trash Can – The students will look at how we are polluting our coastlines. This will lead into the next unit which will focus on coastline change along the Jersey Shore

STAGE THREE

LEARNING PLAN

The students will complete activities in groups and they will also complete lab summaries. They will focusing on a project based curriculum. They will also do research in the computer lab focusing on the current trends in sustainability.

Unit Name: Energy **Time Frame: 10 weeks**

Author: Egg Harbor Township High School Science Department

UNIT

Subject: **Science** Country: **USA**

Course/Grade: **College Prep Sustainability/12** State/Group: **NJ**

School: **Egg Harbor Township High School**

UNIT SUMMARY- The purpose of this unit is to understand how energy is transferred and how this would affect a growing population. Every human uses energy in some form and some countries use more energy than others. The students will be determining how to make energy use sustainable.

UNIT RESOURCES- Project Based Activities

Internet Resource Links: Google and other search engines

STAGE ONE

GOALS AND STANDARDS-

HT-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants

HS-ETS1-2 Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

HS-ETS1-3 Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.

HS-ESS3-4 Evaluate or refine a technological solution that reduces impacts of human activities on natural systems

The goal of this unit is for the students to realize energy cannot be destroyed only transferred however energy use in the future depends on whether it can become sustainable.

ENDURING UNDERSTANDINGS

The big idea for this unit is that there needs to be a balance between the needs of the environment and the needs of humans within the environment. The students will also need to be able build models of alternative forms of energy. The misunderstanding coming into class may be that there is an endless supply of energy on this planet however the difficulty arises in how to harness that energy.

ESSENTIAL QUESTIONS

1. How can we best balance our own interests and needs with the health of the environment?
2. How can energy best be put to use when designing a sustainable city?

KNOWLEDGE AND SKILLS

Content: Vocabulary- energy, alternative, biofuels, half life

Skills:

Identify how governments work with each other and citizens to form sound environmental policy

Research how energy is transported in Atlantic County

Build a sustainable city with special focus on how energy would be transported through their city.

STAGE TWO

PERFORMANCE TASKS

Amazing Waves- The students will complete an activity on how our coastlines have changed in New Jersey over the years and they will then complete a lab on what this could mean for coastal populations.

Nuclear Fuel- The students will look at nuclear fuel as a method of energy and costs and benefits of this.

Biodiesel- The students will look at biodiesel as form of alternative energy and if it is viable for the future.

Solar Water Heating – The students will plan a way to heat water using solar power

Renewable Energy- The students will build models of each type of renewable energy which will then be used in the building of their town. They will look at the costs and benefits associated with this.

OTHER EVIDENCE

-Complete lab summaries

- Sustainable Town- The students will take the knowledge that they have gained through the process of building and using different types of renewable energy and will build and plan out a sustainable town around the classroom.

STAGE THREE

LEARNING PLAN

The students will complete activities in groups and they will also complete lab summaries. They will focusing on a project based curriculum. They will also do research in the computer lab focusing on the current trends in sustainability.

Unit Name: Green Building **Time Frame: 9 weeks**

Author: Egg Harbor Township High School Science Department

UNIT

Subject: **Science** Country: **USA**

Course/Grade: **College Prep Sustainability/12** State/Group: **NJ**

School: **Egg Harbor Township High School**

UNIT SUMMARY- The purpose of this unit is to determine if a completely self-sustaining environment is feasible.

UNIT RESOURCES- Project Based Activities

Internet Resource Links: Google and other search engines

STAGE ONE

GOALS AND STANDARDS-

HS-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants

HS-ESS3-4 Evaluate or refine a technological solution that reduces impacts of human activities on natural systems

HS-ETS1-2 Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

HS-ETS1-3 Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.

The goal of this unit is to be able to design and set up a self-sustaining environment that could exist on Mars.

ENDURING UNDERSTANDINGS

The big idea for this unit is how can we put all of the knowledge gained so far this year and parlay it into building a completely self-sustaining system. The misunderstanding coming into class may be that students do not completely understand that there is currently a plan in place to put humans on Mars.

ESSENTIAL QUESTIONS

1. What are the essential human survival needs in an extreme environment?
2. How could plants be grown without soil?
3. How could we plan for a self-sustaining ecosystem on Mars?

KNOWLEDGE AND SKILLS

Content: Vocabulary- survival needs, Mars

Skills:

Identify survival needs in extreme environments

Identify what would be needed for humans to live on Mars

STAGE TWO

PERFORMANCE TASKS

Yeast Lab- The students will use yeast as an example of how important resources are to an organisms survival

Soil less garden- The students will apply concepts from the first unit and will see how it would be possible to grow crops if no soil is available

Survival island- The students will look at human requirements in order to live and how to find these resources when confronted with a disaster scenario

Build Your Own Microism- The students will build and tend their own microism in order to show knowledge of how important resources are to the survival of a population.

Man Vs. The Universe- The students will ask the question of is it possible for a human to habitat Mars. They will look at the specific problems humans will face on another planet.

OTHER EVIDENCE

-Lab Summaries

Solar Science Station- As a final culminating task the students will find themselves on a space station far from Earth and they have a problem with their water supply. The students will problem solve in order to figure out how to survive and how to get back to Earth safely.

STAGE THREE

LEARNING PLAN

The students will complete activities in groups and they will also complete lab summaries. They will focusing on a project based curriculum. They will also do research in the computer lab focusing on the current trends in sustainability.

Curriculum Resources - Differentiated Instruction

Special Education Interventions in General Education

Visual Supports
Extended time to complete tests and assignments
Graphic Organizers
Mnemonic tricks to improve memory
Study guides
Use agenda book for assignments
Provide a posted daily schedule
Use of classroom behavior management system
Use prompts and model directions
Use task analysis to break down activities and lessons into each individual step needed to complete the task
Use concrete examples to teach concepts
Have student repeat/rephrase written directions
Heterogeneous grouping

Resources:

Do to Learn:
http://www.do2learn.com/

Sen Teacher:
http://www.senteacher.org/

Intervention Central:
http://www.interventioncentral.org/

Learning Ally:
https://www.learningally.org/

English Language Learners Interventions in Regular Education
Resources:

FABRIC - Learning Paradigm for ELLs (NJDOE)
www.nj.gov/education/bilingual/pd/**fabric**/**fabric**.pdf

Guide to Teaching ELL Students
http://www.colorincolorado.org/new-teaching-ells

Edutopia - Supporting English Language Learners
https://www.edutopia.org/blog/strategies-and-resources-supporting-ell-todd-finley

Reading Rockets
http://www.readingrockets.org/reading-topics/english-language-learners

Gifted and Talented Interventions in Regular Education
Resources:

Who are Gifted and Talented Students
http://www.npr.org/sections/ed/2015/09/28/443193523/who-are-the-gifted-and-talented-and-what-do-they-need

Hoagies Gifted Education Page
http://www.hoagiesgifted.org/programs.htm

21st Century Learning
Resources:

Partnership for 21st Century Learning
http://www.p21.org/

Career Ready Practices (NJDOE)
http://www.nj.gov/education/cte/hl/CRP.pdf