EGG HARBOR TOWNSHIP PUBLIC SCHOOLS
CURRICULUM

MEDICAL SCIENCE ACADEMY: STEM Science 2.0

Length of Course:	Full Year
Elective / Required:	Refer to Program of Studies
Schools:	High School
Student Eligibility:	Grade 09
Credit Value:	5 credits
Date Submitted:	September 2014
Date Approved:	

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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: Unit 1: Introduction to high school and digital citizenship
Time Frame: 2 days
Author: Egg Harbor Township High School Science Department

UNIT

Subject: HN Science 2.0 Country: **USA**
Course/Grade: 9th State/Group: **NJ**
School: **Egg Harbor Township High School**

UNIT SUMMARY
Students will be introduced to rules of the high school and the classroom. Students will research good study habits and what it means to be a good digital citizen. Students will explore how scientists keep the general public up to date on their research. Students will also explore why a high school student would need a resume and correct etiquette using social media and email.

UNIT RESOURCES

- Lecture outline and PowerPoint
- News articles
- Video clips
- Web research

Internet Resource Links:

- BBC article, http://www.bbc.com/news/science-environment-23576143
- BBC article, http://www.bbc.com/news/science-environment-23576143
- How to study, http://www.wikihow.com/Study
- Have fun while studying, http://www.wikihow.com/Have-Fun-While-Studying

STAGE ONE

GOALS AND STANDARDS
RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. (HS-PS1-1)

RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-PS1-3), (HS-PS2-6)

WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific

procedures/ experiments, or technical processes. (HS-PS2-6)

WHST.9-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (HS- PS1-3)

WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. (HS-PS1-3) Draw evidence from informational texts to support analysis, reflection, and research. (HS-PS1-3)

WHST.9-12.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. (HS-PS1-2)

MP.2 Reason abstractly and quantitatively. (HS-PS3-1), (HS-PS3-2), (HS-PS3-3), (HS-PS3-4), (HS-PS3-5)

SL.11-12.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. (HS-PS3-1), (HS-PS3-2), (HS-PS3-5)

WHST.9012.9 Draw evidence from informational texts to support analysis, reflection, and research. (HS-PS3-4), (HS-PS3-5)

ENDURING UNDERSTANDINGS

1. Students will learn how to properly and efficiently study which will help them throughout the rest of their education.
2. Students will learn appropriate posting for social media, pause before you post.
3. Students will learn how scientific research is carried out in the real world.
4. Students will learn how to create a resume and why it is important to have one.

ESSENTIAL QUESTIONS

1. How would you make your studying session more efficient?
2. How would you become a good digital citizen?
3. How do scientists keep the general public up to date on their research?
4. Why is it important to have a competitive high school resume?

KNOWLEDGE AND SKILLS

SWBAT:

1. Students will research study habits and determine which study habits will help them become more efficient at studying.
2. Students will learn how their actions on social networks like Facebook, Twitter, instagram, and Edmodo can affect their future career prospects. (Pause before you post.)
3. Students will learn how to research creditable articles and share their findings with the class.
4. Students will hypothesis way to contribute to the school and community.

STAGE TWO

PERFORMANCE TASKS

- Critical reading of articles and writing responses.

- Creating an Edmodo account and following good digital citizenship behaviors throughout the year.
- Creating a list of volunteer work, clubs, sports, and other activities to create a resume at the end of the year.

OTHER EVIDENCE

- In class discussions

STAGE THREE

LEARNING PLAN

- Introduction of class and instructor.
    - Icebreaker - find someone you don't know and ask them their name and one fact about them. Then present to the class.
- Go over the syllabus for the class.
- Go over what National Honor Society is and how they should prepare for the application process.
- Go over Edmodo and give them time to sign up in class using the iPads, personal electronics.
- Explain the "Do you know how to study assignment" and the "growing meat article" due next class period.
- Class section names

Student progress will be measured by formative and summative assessments. To maximize student understanding current and cumulative topics will be assessed weekly.
This unit is sequenced to begin with an informal assessment of prior knowledge of topics within the unit and determine any misconceptions. Students will then build small concrete blocks of information pertinent to mastery of this unit. Finally, students will be asked to use this information to evaluate higher-level problems. This unit will end with a formal assessment common to all honors students.
To maximize student understanding significant figures is taught earlier than in the textbook sequence, this is to give students maximum time learning these difficult concepts before the summative assessment.

Common Misconceptions

One common misconception students have when entering high school is that it is a continuation of middle school, by going over the syllabus and school rules on the first day this helps them see the level expected of them. Another misconception is that students only need to be smart to get into good colleges. By going over the National Honor Society requirements students learn that they need to do more than just schoolwork during their time here at the high school.

Unit Name: Unit 2: Scientific units and measurements
Time Frame: 3 weeks
Author: Egg Harbor Township High School Science Department

UNIT

Subject: HN Science 2.0 Country: **USA**
Course/Grade: 9th State/Group: **NJ**
School: **Egg Harbor Township High School**

UNIT SUMMARY
This unit builds upon the students' current understanding of the metric system and introduces new concepts and tools they will need to master to be a successful high school science student. First, the review of units, prefixes, and scientific notation helps ensure all students have the same basic understanding. We then complete a detailed explanation of significant figures, how to use them and why they are important. After we understand the basics of significant figures we will learn how to read and use lab equipment and test our abilities by determining the density of objects. We will also go over lab safety and procedures.

UNIT RESOURCES

- Lecture outline and PowerPoint
- Video clips
- Accuracy and Precision demo
- Unit 1 packet Topics: Units, prefixes, scientific notation
- Sig Fig ruler activity I: The three rulers
- Sig fig ruler activity II: Using a ruler, measuring lines
- Sig fig graduated cylinder drawing demo
- Reading a graduated cylinder station activity.
- Unit 1 packet Topics: Sig figs, sig figs in calculations, Density
- Density Lab with Pennies
- Practice Test
- Lab safety talk
- Test

Internet Resource Links:

- Edmodo.com
- Masteringbiology.com
- http://www.planetseed.com/sciencearticle/importance-units

STAGE ONE

GOALS AND STANDARDS
HS-PS1-3 Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles. [Clarification Statement: Emphasis is on understanding the strengths of forces between particles, not on naming specific intermolecular forces (such as dipole-dipole). Examples of particles could include ions, atoms, molecules, and networked materials (such as graphite). Examples of bulk properties of substances could include the melting point and boiling point, vapor pressure, and surface tension.] [Assessment Boundary: Assessment does not include Raoult's law calculations of vapor pressure.]

HS-PS2-6 Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.* [Clarification Statement: Emphasis is on the attractive and repulsive forces that determine the functioning of the material. Examples could include why electrically conductive materials are often made of metal, flexible but durable materials are made up of long chained molecules, and pharmaceuticals are designed to interact with specific receptors.] [Assessment Boundary: Assessment is limited to provide molecular structures of specific designed materials.]
PS1.A: Structure and Properties of Matter. The structure and interactions of matter at the bulk scale are determined by electrical forces within and between atoms. (HS-PS1-3), (secondary to HS-PS2-6)
HS-LS1-1. Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells. [Assessment Boundary: Assessment does not include identification of specific cell or tissue types, whole body systems, specific protein structures and functions, or the biochemistry of protein synthesis.]
LS1.A: Structure and Function Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1) All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (HS-LS1-1) (Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)
RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. (HS-PS1-1)
RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-PS1-3), (HS-PS2-6)
WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-PS2-6)
WHST.9-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (HS- PS1-3)
WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. (HS-PS1-3) Draw evidence from informational texts to support analysis, reflection, and research. (HS-PS1-3)
MP.4 Model with mathematics.
HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-PS1-3), (HS-PS1-8), (HS-PS2-6)
HSN-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-PS1-8), (HS-PS2-6)
HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-PS1-3), (HS-PS1-8), (HS-PS2-6)
WHST.9-12.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. (HS-PS1-2)
MP.2 Reason abstractly and quantitatively. (HS-PS3-1), (HS-PS3-2), (HS-PS3-3), (HS-PS3-4), (HS-PS3-5)
SL.11-12.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. (HS-PS3-1), (HS-PS3-2), (HS-PS3-5)
WHST.9012.9 Draw evidence from informational texts to support analysis, reflection, and research. (HS-PS3-4), (HS-PS3-5)

HSA.CED.A.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. (HS-PS4-1), (HS-PS4-3)

UNDERSTANDINGS

1. Students will improve their understanding of the metric system by a review of units, prefixes, and scientific notation. This helps to ensure all students are on the same page.
2. Students will complete a detailed explanation of significant figures, how to use them and why they are important.
3. Students will then understand how to read and use lab equipment.
4. Students will also understand lab safety and procedures.

ESSENTIAL QUESTIONS

1. Why is it necessary to use a common set of measurement units (the metric system)?
2. Why are significant figures significant?
3. How can you find the density of various objects?

KNOWLEDGE AND SKILLS

SWBAT:

1. Distinguish between accuracy and precision via the bull's eye lab.
2. Understand the importance of significant figures via the ruler demo lab.
3. Find the density of the same metal that is different shapes to see that density is an intensive property.
4. Find the density of an irregularly shaped object using the water displacement and graduated cylinder techniques.
5. Explain safety procedures.

STAGE TWO

PERFORMANCE TASKS

- Accuracy and Precision activity
- Unit 1 packet Topics: Units, prefixes, scientific notation
- Sig Fig ruler activity I: The three rulers
- Sig fig ruler activity II: Using a ruler, measuring lines
- Sig fig graduated cylinder drawing demo
- Reading a graduated cylinder station activity
- Unit 1 packet Topics: Sig figs, sig figs in calculations, Density
- Density Lab with Pennies
- Practice Test
- Lab safety talk
- Test

OTHER EVIDENCE

- Common assessment quiz
- Common assessment chapter test
- Review Activity

STAGE THREE

LEARNING PLAN

- Flashcards and/or drill and practice
- Power point presentations
- Lecture with note taking or guided notes
- Whole and small group discussions
- Laboratory groups
- Inquiry based activities with reflective discussion
- Online models and simulators

Student progress will be measured by formative and summative assessments. To maximize student understanding current and cumulative topics will be assessed weekly.
This unit is sequenced to begin with an informal assessment of prior knowledge of topics within the unit and determine any misconceptions. Students will then build small concrete blocks of information pertinent to mastery of this unit. Finally, students will be asked to use this information to evaluate higher-level problems. This unit will end with a formal assessment common to all honors students.
To maximize student understanding significant figures is taught earlier than in the textbook sequence, this is to give students maximum time learning these difficult concepts before the summative assessment.

Common Misconceptions

Students have trouble grasping why significant figures are important. To try to help them understand it we go over real world examples where they can grasp what a good estimation is before changing it over to lab materials.
Students sometimes have the misconception that density of an object can change by changing the shape of the object. We are going to use the same substance but different shapes and sizes of it to help correct this misconception.

Unit Name: Unit 3: The Chemical Basis of Life
Time Frame: 3 weeks
Author: Egg Harbor Township High School Science Department

UNIT

Subject: HN Science 2.0 Country: **USA**
Course/Grade: 9th State/Group: **NJ**
School: **Egg Harbor Township High School**

UNIT SUMMARY
This unit explores the differences between elements, atoms, and compounds. Then it explains how chemical bonds are formed. Water's life supporting properties are explored as well as pH, acids, and bases. This section goes over the honors biology summer work.

UNIT RESOURCES

- Textbook (Campbell Biology 7th edition: Chapter 2),
- Lecture outline and PowerPoint
- Video clips
- Antibiotics lab
- pH indicator lab
- Mars rover video
- Surface tension activities

Internet Resource Links:

- Edmodo.com
- Masteringbiology.com
- http://video.nationalgeographic.com/video/news/mars-curiosity-rover-vin

STAGE ONE

GOALS AND STANDARDS
HS-PS1-1. Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms. [Clarification Statement: Examples of properties that could be predicted from patterns could include reactivity of metals, types of bonds formed, numbers of bonds formed, and reactions with oxygen.] [Assessment Boundary: Assessment is limited to main group elements. Assessment does not include quantitative understanding of ionization energy beyond relative trends.]
HS-PS1-3. Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles. [Clarification Statement: Emphasis is on understanding the strengths of forces between particles, not on naming specific intermolecular forces (such as dipole-dipole). Examples of particles could include ions, atoms, molecules, and networked materials (such as graphite). Examples of bulk properties of substances could include the melting point and boiling point, vapor pressure, and surface tension.] [Assessment Boundary: Assessment does not include Raoult's law calculations of vapor pressure.]
HS-PS2-6 Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.* [Clarification Statement: Emphasis is on the attractive and repulsive forces that determine the functioning of the material. Examples could include why electrically conductive materials are often made of metal, flexible but durable materials are made up of long chained molecules, and pharmaceuticals are designed to interact with specific receptors.] [Assessment Boundary: Assessment is limited to provide molecular structures of specific designed materials.]
RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. (HS-PS1-1)

RST.11-12.1 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. (HS-PS1-1) Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-PS1-3), (HS-PS2-6)
WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-PS2-6)
WHST.9-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (HS- PS1-3)
WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. (HS-PS1-3)
WHST.9-12.9 Draw evidence from informational texts to support analysis, reflection, and research. (HS-PS1-3)

UNDERSTANDINGS

1. Students will gain an appreciation and understanding of the structure of an atom.
2. Students will understand the role of chemical bonds and how they make life possible.
3. Students will understand that waters polarity gives it properties that allow life to exist on Earth.
4. Students will understand that pH levels affect living organisms.

ESSENTIAL QUESTIONS

1. How do atoms and elements influence organisms?
2. How do chemical bonds interact in organisms?
3. Why is an understanding of chemistry and the properties of water important for understanding biology?

KNOWLEDGE AND SKILLS

SWBAT:

1. Differentiate between atoms, elements, and compounds
2. Explain why trace elements are necessary for good health
3. Explain the parts of an atom
4. Medical benefits of radioactive isotopes
5. Electrons role in bonding
6. Ionic, covalent, H bonds
7. Water density
8. Water solvent of life
9. pH / acids and bases
10. acid precipitation

STAGE TWO

PERFORMANCE TASKS

- Students will research mineral deficiencies and present their results to the class.
- Students will construct atoms using 3D modeling software on the internet.
- Students will complete a pH lab
- Students will complete a surface tension activity.
- Students will research isotopes.
- Students will also need to identify and classify different elements, compounds, homogeneous or heterogeneous mixtures.

- Students will complete homework.

OTHER EVIDENCE

- Common assessment quiz
- Common assessment chapter test
- Review Activity

STAGE THREE

LEARNING PLAN

- Flashcards and/or drill and practice
- Power point presentations
- Lecture with note taking or guided notes
- Whole and small group discussions
- Laboratory groups
- Inquiry based activities with reflective discussion
- Online models and simulators

Student progress will be measured by formative and summative assessments. To maximize student understanding current and cumulative topics will be assessed weekly.
This unit is sequenced to begin with an informal assessment of prior knowledge of topics within the unit and determine any misconceptions. Students will then build small concrete blocks of information pertinent to mastery of this unit. Finally, students will be asked to use this information to evaluate higher-level problems. This unit will end with a formal assessment common to all honors students.
To maximize student understanding significant figures is taught earlier than in the textbook sequence, this is to give students maximum time learning these difficult concepts before the summative assessment.

Common Misconceptions

Students commonly mistake covalent and ionic bonding so it will be important to emphasize that ionic is the loss or gain of electrons and covalent is the sharing of electrons.
Students often have trouble understanding the water's polarity causes all of waters characteristics necessary for life.
Students also have difficulty understanding the pH scale since it is a logarithmic scale and they haven't learned about logs in math class yet. We will go over the how the scale works and then apply it to the pH scale.

Unit Name: Unit 4: The molecules of life
Time Frame: 3 weeks
Author: Egg Harbor Township High School Science Department

UNIT

Subject: HN Science 2.0 Country: **USA**
Course/Grade: 9th State/Group: **NJ**
School: **Egg Harbor Township High School**

UNIT SUMMARY
This unit emphasizes how important carbon bonding is to life on Earth. Students will learn how to create models of hydrocarbons and they will gain an understanding of how functional groups make endless possibilities for molecule arrangement and function. Students will also gain an understanding of how the four main groups of molecules differ and work together to create life. Students will also understand the role of enzymes and how they affect organisms.

UNIT RESOURCES

- Lecture outline and PowerPoint
- Video clips
- Model building kits
- Toothpickase lab
- How does global warming affect the success of organisms? Lab
- Oil vs. water lab

Internet Resource Links:

- Edmodo.com
- Masteringbiology.com
- http://library.med.utah.edu/NetBiochem/macromol.htm

STAGE ONE

GOALS AND STANDARDS
HS-LS1-1. Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells. [Assessment Boundary: Assessment does not include identification of specific cell or tissue types, whole body systems, specific protein structures and functions, or the biochemistry of protein synthesis.]
LS1.A: Structure and Function Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1) All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (HS-LS1-1) (Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)
HS-PS2-6 Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.* [Clarification Statement: Emphasis is on the attractive and repulsive forces that determine the functioning of the material. Examples could include why electrically conductive materials are often made of metal, flexible but durable materials are made up of long chained molecules, and pharmaceuticals are designed to interact with specific receptors.] [Assessment Boundary: Assessment is limited to provide molecular structures of specific designed materials.]
PS1.A: Structure and Properties of Matter. The structure and interactions of matter at the bulk scale are determined by electrical forces within and between atoms. (HS-PS1-3), (secondary to HS-PS2-6)

RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. (HS-PS1-1)
RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-PS1-3), (HS-PS2-6)
WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-PS2-6)
WHST.9-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (HS- PS1-3)
WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. (HS-PS1-3) Draw evidence from informational texts to support analysis, reflection, and research. (HS-PS1-3)
MP.4 Model with mathematics.
HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-PS1-3), (HS-PS1-8), (HS-PS2-6)
HSN-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-PS1-8), (HS-PS2-6)
HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-PS1-3), (HS-PS1-8), (HS-PS2-6)
WHST.9-12.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. (HS-PS1-2)
MP.2 Reason abstractly and quantitatively. (HS-PS3-1), (HS-PS3-2), (HS-PS3-3), (HS-PS3-4), (HS-PS3-5)
SL.11-12.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. (HS-PS3-1), (HS-PS3-2), (HS-PS3-5)
WHST.9012.9 Draw evidence from informational texts to support analysis, reflection, and research. (HS-PS3-4), (HS-PS3-5)
HSA.CED.A.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. (HS-PS4-1), (HS-PS4-3)

UNDERSTANDINGS

1. Students will gain an understanding of how important carbon bonding is to life on Earth.
2. Students will learn how to create models of hydrocarbons and they will gain an understanding of how functional groups make endless possibilities for molecule arrangement and function.
3. Students will also gain an understanding of how the four main groups of molecules differ and work together to create life.
4. Students will also understand the role of enzymes and how they affect organisms.

ESSENTIAL QUESTIONS

1. What do the molecules of life look like?
2. How do the various structures of organic compounds affect their functions how they are used by living things?
3. How does carbon allow for the different properties of life?
4. Why are enzymes required for living organisms?

KNOWLEDGE AND SKILLS

SWBAT:

1. Students will be able to explain the importance of carbon bonding to life on Earth.

2. Students will be able to create models of carbon containing molecules and identify the functional groups attached.
3. Students will also gain an understanding of how the four main groups of molecules differ and work together to create life. Students will also understand the role of enzymes and how they affect organisms.
4. Students will be able to identify bonds in molecules.
5. Students will be able to explain why water and oil do not heat up at the same rate.

STAGE TWO

PERFORMANCE TASKS

- Lecture outline
- Model building activity
- Toothpickase lab
- How does global warming affect the success of organisms? Lab
- Vocab quiz 1
- Vocab quiz 2
- Skills review
- Unit 4 macromolecules WS HW
- Unit 4 Organic molecules packet
- Unit 4 review
- Coconut oil full lab with report
- Test

OTHER EVIDENCE

- Common assessment quiz
- Common assessment chapter test
- Review Activity

STAGE THREE

LEARNING PLAN

- Flashcards and/or drill and practice
- Power point presentations
- Lecture with note taking or guided notes
- Whole and small group discussions
- Laboratory groups
- Inquiry based activities with reflective discussion
- Online models and simulators

Student progress will be measured by formative and summative assessments. To maximize student understanding current and cumulative topics will be assessed weekly.
This unit is sequenced to begin with an informal assessment of prior knowledge of topics within the unit and determine any misconceptions. Students will then build small concrete blocks of information pertinent to mastery of this unit. Finally, students will be asked to use this information to evaluate higher-level problems. This unit will end with a formal assessment common to all honors students.
To maximize student understanding significant figures is taught earlier than in the textbook sequence, this is to give students maximum time learning these difficult concepts before the summative assessment.

Common Misconceptions

Common misconceptions with model building happen when students don't realize that they need to fill all the holes in each of the molecular atoms to make the correct bond types.

Students also have trouble understanding that water takes more energy to heat up due to hydrogen bonding between water molecules when you compare it with oil.

Unit Name: Unit 5: The History of Medicine
Time Frame: 5 weeks
Author: Egg Harbor Township High School Science Department

UNIT

Subject: HN Science 2.0 Country: **USA**
Course/Grade: 9th State/Group: **NJ**
School: **Egg Harbor Township High School**

UNIT SUMMARY
This unit emphasizes human migration out of Africa and how early civilizations reacted to disease. The Black Plague and other infections are covered in this unit. Students will also gain an appreciation for how artists helped with understanding human anatomy and how the profession of the doctor came to be and evolved. Students will also explore how virus' spread and the different ways to inoculate communities.

UNIT RESOURCES

- Lecture outline and PowerPoint
- Video clips (http://www.history.com/shows/mankind-the-story-of-all-of-us)
- Urine analysis lab
- STI infection lab
- Microscopy skills
- The Golden Fleece Lab

Internet Resource Links:

- Edmodo.com
- http://www.michrenfest.com/the_black_plague_classroom_simulation.pdf
- http://www.bradshawfoundation.com/journey/
- http://www.sciencemuseum.org.uk/broughttolife/themes/diseases/black_death.aspx

STAGE ONE

GOALS AND STANDARDS
HS-LS2-6. Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem. [Clarification Statement: Examples of changes in ecosystem conditions could include modest biological or physical changes, such as moderate hunting or a seasonal flood; and extreme changes, such as volcanic eruption or sea level rise
HS-LS2-7 Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.* [Clarification Statement: Examples of human activities can include urbanization, building dams, and dissemination of invasive species.]
HS-LS2-8 Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce. [Clarification Statement: Emphasis is on: (1) distinguishing between group and individual behavior, (2) identifying evidence supporting the outcomes of group behavior, and (3) developing logical and reasonable arguments based on evidence. Examples of group behaviors could include flocking, schooling, herding, and cooperative behaviors such as hunting, migrating, and swarming.]
All units:
RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. (HS-PS1-1)

RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-PS1-3), (HS-PS2-6)
WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-PS2-6)
WHST.9-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (HS- PS1-3)
WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. (HS-PS1-3) Draw evidence from informational texts to support analysis, reflection, and research. (HS-PS1-3)
MP.4 Model with mathematics.
HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-PS1-3), (HS-PS1-8), (HS-PS2-6)
HSN-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-PS1-8), (HS-PS2-6)
HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-PS1-3), (HS-PS1-8), (HS-PS2-6)
WHST.9-12.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. (HS-PS1-2)
MP.2 Reason abstractly and quantitatively. (HS-PS3-1), (HS-PS3-2), (HS-PS3-3), (HS-PS3-4), (HS-PS3-5)
SL.11-12.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. (HS-PS3-1), (HS-PS3-2), (HS-PS3-5)
WHST.9012.9 Draw evidence from informational texts to support analysis, reflection, and research. (HS-PS3-4), (HS-PS3-5)
HSA.CED.A.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. (HS-PS4-1), (HS-PS4-3)

UNDERSTANDINGS

1. Students will gain an understanding of human migration out of Africa and how early civilizations reacted to diseases.
2. Students will also gain an understanding of how infections and The Black Plague were transmitted.
3. Students will gain an understanding of the portrayal of science during this time frame.
4. Students will also gain an appreciation for how artists helped with understanding human anatomy.
5. Students will gain an understanding of how the profession of the doctor came to be and evolved.
6. Students will also explore how virus' spread and the different ways to inoculate communities.

ESSENTIAL QUESTIONS

1. What events in history led to medicine as we know it today?
2. How are diseases transmitted?
3. How do vaccinations work?
4. What was the effect that the Black Plague had on Europe?
5. How can the actions of early civilizations still affect medicine today?

KNOWLEDGE AND SKILLS

SWBAT:

1. Students will be able to explain some of the major medical breakthroughs throughout history.
2. Students will be able to explain how diseases are transmitted by giving examples.
3. Students will be able to explain the evolution of vaccination.
4. Students will be able to explain the effect the Black Plague had on Europe.

STAGE TWO

PERFORMANCE TASKS

- Lecture outline
- Group disease research
- Human movement timeline summary
- Black Plague animation summary
- Urine analysis lab
- STI infection Lab
- The golden fleece lab
- Test

OTHER EVIDENCE

- Common assessment quiz
- Common assessment chapter test
- Review Activity

STAGE THREE

LEARNING PLAN

- Flashcards and/or drill and practice
- Power point presentations
- Lecture with note taking or guided notes
- Whole and small group discussions
- Laboratory groups
- Inquiry based activities with reflective discussion
- Online models and simulators

Student progress will be measured by formative and summative assessments. To maximize student understanding current and cumulative topics will be assessed weekly.
This unit is sequenced to begin with an informal assessment of prior knowledge of topics within the unit and determine any misconceptions. Students will then build small concrete blocks of information pertinent to mastery of this unit. Finally, students will be asked to use this information to evaluate higher-level problems. This unit will end with a formal assessment common to all honors students.

Common Misconceptions

Common misconceptions in this unit involve students falsely believing virus and bacteria diseases can be treated in the same way.
Another misconception is how that diseases had developed recently, in this chapter we show evidence that disease was present in early human civilizations and some of the same diseases we are fighting now were present in ancient times.

Unit Name: Unit 6: Introduction to STEM
Time Frame: 20 weeks
Author: Egg Harbor Township High School Science Department

UNIT

Subject: HN Science 2.0 Country: **USA**
Course/Grade: 9th State/Group: **NJ**
School: **Egg Harbor Township High School**

UNIT SUMMARY

This unit starts with reverse engineering simple objects and drawing explosion diagram schematics with instructions on how to take apart and put back together the equipment. This unit continues with students building physical robots that they then have to control using software. Their programs will include loops and logic switches. In this unit students will understand how electricity works and different way to manipulate its flow. The students will also explore renewable resources and build solar systems and wind turbines.

UNIT RESOURCES

- Reverse engineering lab (Introduction)
- Reverse engineering lab (Advanced)
- Computer reverse engineering lab
- Electrical Circuit lab
- Solar electricity project
- Holiday lights project
- Lego NXT Robotics kits

Internet Resource Links:

- Edmodo.com
- http://www.nxtprograms.com/projects2.html#ProjectsByBuilding

STAGE ONE

GOALS AND STANDARDS

HS-PS3-3 Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.* [Clarification Statement: Emphasis is on both qualitative and quantitative evaluations of devices. Examples of devices could include Rube Goldberg devices, wind turbines, solar cells, solar ovens, and generators. Examples of constraints could include use of renewable energy forms and efficiency.] [Assessment Boundary: Assessment for quantitative evaluations is limited to total output for a given input. Assessment is limited to devices constructed with materials provided to students.]

HS-PS4-2 Evaluate questions about the advantages of using a digital transmission and storage of information. [Clarification Statement: Examples of advantages could include that digital information is stable because it can be stored reliably in computer memory, transferred easily, and copied and shared rapidly. Disadvantages could include issues of easy deletion, security, and theft.]

HS-PS4-5. Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.* [Clarification Statement: Examples could include solar cells capturing light and converting it to electricity; medical imaging; and communications technology.] [Assessment Boundary: Assessments are limited to qualitative information. Assessments do not include band theory.]

HS-LS2-7 Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.* [Clarification Statement: Examples of human activities can include urbanization, building dams, and dissemination of invasive species.]

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-ETS1-3 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.

All units:
RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. (HS-PS1-1)
RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-PS1-3), (HS-PS2-6)
WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-PS2-6)
WHST.9-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (HS- PS1-3)
WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. (HS-PS1-3) Draw evidence from informational texts to support analysis, reflection, and research. (HS-PS1-3)
MP.4 Model with mathematics.
HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-PS1-3), (HS-PS1-8), (HS-PS2-6)
HSN-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-PS1-8), (HS-PS2-6)
HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-PS1-3), (HS-PS1-8), (HS-PS2-6)
WHST.9-12.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. (HS-PS1-2)
MP.2 Reason abstractly and quantitatively. (HS-PS3-1), (HS-PS3-2), (HS-PS3-3), (HS-PS3-4), (HS-PS3-5)
SL.11-12.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. (HS-PS3-1), (HS-PS3-2), (HS-PS3-5)
WHST.9012.9 Draw evidence from informational texts to support analysis, reflection, and research. (HS-PS3-4), (HS-PS3-5)
HSA.CED.A.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. (HS-PS4-1), (HS-PS4-3)

UNDERSTANDINGS

1. Students will gain an understanding of the complexity of objects by taking apart common products and writing detailed instructions on how to take them apart and put them back together by reverse engineering.
2. Students will gain an understanding of the structure of a computer and its main components.

3. Students will gain an understanding of electricity by constructing an electrical circuit and study how electricity travels throughout it.
4. Students gain an understanding of manufacturing a product by designing, building, and making a marketing brochure for their product.
5. Students gain an understanding of renewable resources by building circuits powered by solar panels and wind turbines.

ESSENTIAL QUESTIONS

1. Why are explosion diagrams used?
2. Why do people reverse engineer things?
3. How does electricity work?
4. How do the parts of a computer interact?
5. *How do computer programs control physical objects?*
6. *How can robots solve real world problems?*
7. *How can solar power decrease human impact on the environment and how can it increase human impact on the environment?*
8. *How do 3D printers work?*

KNOWLEDGE AND SKILLS

SWBAT:

1. Students will be able to examine an object and hypothesize how it can be taken apart.
2. Students will know how to take detailed notes while taking something apart so they can figure out how it can go back together. This approach to thinking about how things work will help them with dissections in future classes.
3. Students will be able to compare the basic parts of a computer with a brain and make comparisons between the two.
4. Students will be able to build and program machines using to solve problems.
5. Students will be able to construct electrical circuits and explain how electricity works.
6. Students will be able to construct a product using their knowledge of electricity.

STAGE TWO

PERFORMANCE TASKS

- Reverse engineering Project (Intro)
- Reverse engineering lab (Advanced)
- Computer reverse engineering lab
- Electrical Circuit lab
- Solar electricity project
- Holiday lights project
- Lego NXT Robotics Intro and Advanced projects
- Makerbot 3D printer

OTHER EVIDENCE

- Safety quiz
- Review Activity
- Presentations
- Creation of a robot
- Creation of 3D printed objects

STAGE THREE

LEARNING PLAN

- Flashcards and/or drill and practice
- Power point presentations
- Lecture with note taking or guided notes
- Whole and small group discussions
- Laboratory groups
- Inquiry based activities with reflective discussion
- Online models and simulators

Student progress will be measured by formative and summative assessments. To maximize student understanding current and cumulative topics will be assessed weekly.
This unit is sequenced to begin with an informal assessment of prior knowledge of topics within the unit and determine any misconceptions. Students will then build small concrete blocks of information pertinent to mastery of this unit. Finally, students will be asked to use this information to evaluate higher-level problems. This unit will end with a formal assessment common to all honors students.

Common Misconceptions

Students usually don't understand how electricity works; the introduction to circuits helps them understand how things work.
Students usually don't understand what makes a computer work and how each part needs to be in correct port for the computer to work.
Students have general misconceptions that computer programing is complicated and only some people can do it. After the Lego programing project they will see that everyone is able to write code.

Unit Name: Unit 7: Circulation and Respiration
Time Frame: 4 weeks
Author: Egg Harbor Township High School Science Department

UNIT

Subject: HN Science 2.0 Country: **USA**
Course/Grade: 9th State/Group: **NJ**
School: **Egg Harbor Township High School**

UNIT SUMMARY

This unit starts by introducing students to two organ systems in their body. Using hands on and traditional lectures students will explore how their circulatory and respiratory systems should function and on a basic level be able to identify when their systems are not functioning correctly. Students will first learn the parts of both systems and then by completing labs they will identify how the systems work at rest and during and after exercise. We will also cover lifestyle choices that are good for their bodies and lifestyle choices that increase the likelihood of disease.

UNIT RESOURCES

- Videos (TED talks)
- PowerPoint and lecture
- Spirometer lab
- Lung capacity lab
- Vital systems lab
- Threaded online discussions
- Heart rate and blood pressure lab
- EKG Sensor Lab

Internet Resource Links:

- Edmodo.com
- http://www.animalearn.org/links.php#.U_4rZFNdWd8

STAGE ONE

GOALS AND STANDARDS

HS-PS1-3 Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles. [Clarification Statement: Emphasis is on understanding the strengths of forces between particles, not on naming specific intermolecular forces (such as dipole-dipole). Examples of particles could include ions, atoms, molecules, and networked materials (such as graphite). Examples of bulk properties of substances could include the melting point and boiling point, vapor pressure, and surface tension.] [Assessment Boundary: Assessment does not include Raoult's law calculations of vapor pressure.]

HS-LS1-2 Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. [Clarification Statement: Emphasis is on functions at the organism system level such as nutrient uptake, water delivery, and organism movement in response to neural stimuli. An example of an interacting system could be an artery depending on the proper function of elastic tissue and smooth muscle to regulate and deliver the proper amount of blood within the circulatory system.] [Assessment Boundary: Assessment does not include interactions and functions at the molecular or chemical reaction level.]

LS1.A: Structure and Function Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)

Developing and Using Models Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed world. Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-LS1-2)

HS-LS1-3 Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. [Clarification Statement: Examples of investigations could include heart rate response to exercise, stomata response to moisture and temperature, and root development in response to water levels.] [Assessment Boundary: Assessment does not include the cellular processes involved in the feedback mechanism.]

LS1.A: Structure and Function Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3) Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. (HS-LS1-3)

HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy. [Clarification Statement: Emphasis is on illustrating inputs and outputs of matter and the transfer and transformation of energy in photosynthesis by plants and other photosynthesizing organisms. Examples of models could include diagrams, chemical equations, and conceptual models.] [Assessment Boundary: Assessment does not include specific biochemical steps.]

HS-LS1-6. Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.[Clarification Statement: Emphasis is on using evidence from models and simulations to support explanations.] [Assessment Boundary: Assessment does not include the details of the specific chemical reactions or identification of macromolecules.]

HS-LS1-7 Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy. [Clarification Statement: Emphasis is on the conceptual understanding of the inputs and outputs of the process of cellular respiration.] [Assessment Boundary: Assessment should not include identification of the steps or specific processes involved in cellular respiration.]

HS-LS2-5. Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere. [Clarification Statement: Examples of models could include simulations and mathematical models.] [Assessment Boundary: Assessment does not include the specific chemical steps of photosynthesis and respiration.]

All units:

RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. (HS-PS1-1)
RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-PS1-3), (HS-PS2-6)
WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-PS2-6)
WHST.9-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate;

synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (HS- PS1-3)
WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. (HS-PS1-3) Draw evidence from informational texts to support analysis, reflection, and research. (HS-PS1-3)
MP.4 Model with mathematics.
HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-PS1-3), (HS-PS1-8), (HS-PS2-6)
HSN-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-PS1-8), (HS-PS2-6)
HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-PS1-3), (HS-PS1-8), (HS-PS2-6)
WHST.9-12.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. (HS-PS1-2)
MP.2 Reason abstractly and quantitatively. (HS-PS3-1), (HS-PS3-2), (HS-PS3-3), (HS-PS3-4), (HS-PS3-5)
SL.11-12.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. (HS-PS3-1), (HS-PS3-2), (HS-PS3-5)
WHST.9012.9 Draw evidence from informational texts to support analysis, reflection, and research. (HS-PS3-4), (HS-PS3-5)
HSA.CED.A.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. (HS-PS4-1), (HS-PS4-3)

UNDERSTANDINGS

1. Students will gain an understanding of two organ systems in their body by being able to label the parts of each system and hoe the parts keep them alive.
2. Students will learn to take blood pressure, measure their heart rate, measure their lung capacity, and their breath rate.
3. Students will understand how exercise affects their respiratory and circulatory systems.
4. Students will also have an understanding of lifestyle choices that are good for their bodies and lifestyle choices that increase the likelihood of disease.

ESSENTIAL QUESTIONS

1. How does the human heart work?
2. What nutrients are found in Blood?
3. What is bloods role in the body?
4. How does the heart differ in different organisms?
5. *Why do complex organisms need a circulatory system?*
6. *How does gas exchange occur?*
7. *How did the lungs evolve?*

KNOWLEDGE AND SKILLS

SWBAT:

- Explain breathing in earthworms, insects, fish and humans.
- The structure of the lungs.
- Smoking and how it damages the lungs.
- Negative pressure breathing.
- The brain and breathing.
- Transport of gases throughout the body.

- Human fetal “breathing”.
- Circulatory systems bring nutrients to cell sand remove waste
- The differences in the circulatory system in fish, amphibians, birds/mammals.
- The heart beat cycle.
- The heart and nerves.
- Explain a heart attack.
- Structure of blood vessels.
- Blood pressure and velocity.
- Capillaries and nutrient exchange.
- Blood structure, plasma, and blood stem cells

STAGE TWO

PERFORMANCE TASKS

- Chapter 22 respiration Vocab quiz
- Chapter 22 respiration spirometer lab
- Chapter 22 respiration lung capacity lab
- Chapter 22 respiration Vital signs lab
- Chapter 22 respiration Threaded discussion review
- Chapter 22 respiration – Test
- Chapter 23 circulation – Heart rate and blood pressure lab
- Chapter 23 circulation – EKG sensor lab
- Chapter 23 circulation – Vocabulary quiz
- Chapter 23 circulation – Labeling the circulatory system and heart
- Chapter 23 circulation - Threaded discussion review
- Chapter 23 circulation – Test

OTHER EVIDENCE

- Review Activity
- Presentations

STAGE THREE

LEARNING PLAN

- Flashcards and/or drill and practice
- Power point presentations
- Lecture with note taking or guided notes
- Whole and small group discussions
- Laboratory groups
- Inquiry based activities with reflective discussion
- Online models and simulators

Student progress will be measured by formative and summative assessments. To maximize student understanding current and cumulative topics will be assessed weekly.

This unit is sequenced to begin with an informal assessment of prior knowledge of topics within the unit and determine any misconceptions. Students will then build small concrete blocks of information pertinent to mastery of this unit. Finally, students will be asked to use this information to evaluate higher-level problems. This unit will end with a formal assessment common to all honors students.

Common Misconceptions

Students come into this unit with almost no preexisting knowledge about what controls their breathing. They usually correctly assume that after exercise their heart and breathing rates increase but don't know more than their body needs oxygen. In this chapter it will be explained how the body detects higher levels of carbon dioxide and that triggers breathing, not lower levels of oxygen, which is commonly thought of as the reason breathing happens.

Unit Name: Unit 8: DNA technology
Time Frame: 3 weeks
Author: Egg Harbor Township High School Science Department

UNIT

Subject: HN Science 2.0 Country: **USA**
Course/Grade: 9th State/Group: **NJ**
School: **Egg Harbor Township High School**

UNIT SUMMARY
This unit starts with an introduction to biotechnology and an activity that shows the differences between normally sized molecules and macromolecules. There is a lecture for the chapter and virtual and traditional labs on gel electrophoresis with an emphasis on Forensics. Students will then extract DNA from an onion using lab techniques found in commercial labs and they will explore yeast to determine if it is alive or not. The final lab of the chapter will be exploring the roles of enzymes and the relationship they have with the proteins that they modify.

UNIT RESOURCES
- Videos
- PowerPoint and lecture
- Intro to biotech lab activity part 1
- Intro to biotech lab activity part 2
- Virtual gel electrophoresis lab
- Intro to biotech DNA extraction from an onion Lab
- Gel electrophoresis / Forensics lab
- What is yeast lab
- Bioluminescence lab

Internet Resource Links:
- Edmodo.com
- http://learn.genetics.utah.edu/content/labs/gel/
- http://learn.genetics.utah.edu/content/labs/extraction/
- http://learn.genetics.utah.edu/content/tech/cloning/clickandclone/
- http://www.dnalc.org/resources/animations/cloning101.html
- http://www2.edc.org/weblabs/DNAFingerprinting/DNAFingerprintingMenu.html
- http://www.pbs.org/wgbh/harvest/engineer/
- http://www.biotechnologyonline.gov.au/popups/int_dnaprofiling.html
- http://learn.genetics.utah.edu/content/labs/pcr/
- http://iitb.vlab.co.in/?sub=41&brch=118&sim=375&cnt=1
- http://www.teachersdomain.org/asset/tdc02_int_creatednafp2/

STAGE ONE

GOALS AND STANDARDS
HS-LS1-2 Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. [Clarification Statement: Emphasis is on functions at the organism system level such as nutrient uptake, water delivery, and organism movement in response to neural stimuli. An example of an interacting system could be an artery depending on the proper function of elastic tissue and smooth muscle to regulate and deliver the proper amount of blood within the circulatory system.] [Assessment Boundary: Assessment does not include interactions and functions at the molecular or chemical reaction level.]

LS1.A: Structure and Function Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)

Developing and Using Models Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed world. Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-LS1-2)

HS-LS1-3 Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. [Clarification Statement: Examples of investigations could include heart rate response to exercise, stomata response to moisture and temperature, and root development in response to water levels.] [Assessment Boundary: Assessment does not include the cellular processes involved in the feedback mechanism.]

LS1.A: Structure and Function Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3) Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. (HS-LS1-3)

HS-LS1-1. Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells. [Assessment Boundary: Assessment does not include identification of specific cell or tissue types, whole body systems, specific protein structures and functions, or the biochemistry of protein synthesis.]

HS-LS3-1 Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring. [Assessment Boundary: Assessment does not include the phases of meiosis or the biochemical mechanism of specific steps in the process.]

All units:
RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. (HS-PS1-1)
RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-PS1-3), (HS-PS2-6)
WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-PS2-6)
WHST.9-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (HS- PS1-3)
WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. (HS-PS1-3) Draw evidence from informational texts to support analysis, reflection, and research. (HS-PS1-3)

MP.4 Model with mathematics.
HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-PS1-3), (HS-PS1-8), (HS-PS2-6)
HSN-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-PS1-8), (HS-PS2-6)
HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-PS1-3), (HS-PS1-8), (HS-PS2-6)
WHST.9-12.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. (HS-PS1-2)
MP.2 Reason abstractly and quantitatively. (HS-PS3-1), (HS-PS3-2), (HS-PS3-3), (HS-PS3-4), (HS-PS3-5)
SL.11-12.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. (HS-PS3-1), (HS-PS3-2), (HS-PS3-5)
WHST.9012.9 Draw evidence from informational texts to support analysis, reflection, and research. (HS-PS3-4), (HS-PS3-5)
HSA.CED.A.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. (HS-PS4-1), (HS-PS4-3)

UNDERSTANDINGS

1. Students will gain an understanding of biotechnology and the types of molecules required for carrying out experiments.
2. Students will understand from start to finish the general process of cloning and DNA manipulation.
3. Students will understand how to run gels and do gel analysis to determine the guilt or innocence of a suspect.
4. Students will gain an understanding on how to make a case to determine if something is a living organism or not.
5. Students will gain an understanding to the connection between protein and enzyme.

ESSENTIAL QUESTIONS

1. How are genes cloned?
2. How do enzymes interact with proteins?
3. How can you determine if something is a living organism?
4. How can genetically modified organisms help and hurt the environment?
5. How can DNA profiling be used to solve crimes?
6. Why is genomics important?

KNOWLEDGE AND SKILLS

SWBAT:

1. Students will be able to explain biotechnology.
2. Students will be able to explain from start to finish the general process of cloning and DNA manipulation.
3. Students will be able to run gels and do gel analysis to determine the guilt or innocence of a suspect.
4. Students will be able to make a case to determine if something is a living organism or not.
5. Students will be able to explain the connection between protein and enzyme.
6. Students will be able to describe how a disease is the result of a malfunctioning system, organ, and cell, and relate this to possible treatment interventions (e.g., diabetes, cystic fibrosis, lactose intolerance).
7. Students will be able to explain the value and potential applications of genome projects.

8. Students will be able to predict the potential impact on an organism (no impact, significant impact) given a change in a specific DNA code, and provide specific real world examples of conditions caused by mutations.
9. Students will be able to estimate how closely related species are, based on scientific evidence (e.g., anatomical similarities, similarities of DNA base and/or amino acid sequence).
10. Students will be able to explain the uses for various technologies scientists use and why they use them
11. Students will be able to understand the duplication of DNA via polymerase chain reactions
12. Students will be able to compare and contrast the synthetic cell. Whether it is good or bad for mankind and why.
13. Students will be able to current technologies and drugs used in cancer research
14. Students will be able to describe biochemistry.
15. Students will learn will be able to explain safe lab techniques when dealing with microorganisms and sterile inoculation techniques.
16. Students will be able to explain genomics.

STAGE TWO

PERFORMANCE TASKS

- Intro to biotech lab activity part 1
- Intro to biotech lab activity part 2
- Virtual gel electrophoresis lab
- Intro to biotech DNA extraction from an onion Lab
- Gel electrophoresis / Forensics lab
- What is yeast lab
- Bioluminescence lab

OTHER EVIDENCE

- DNA cloning quiz
- Vocab quizzes
- Review Activity
- Presentations

STAGE THREE

LEARNING PLAN

- Flashcards and/or drill and practice
- Power point presentations
- Lecture with note taking or guided notes
- Whole and small group discussions
- Laboratory groups
- Inquiry based activities with reflective discussion
- Online models and simulators

Student progress will be measured by formative and summative assessments. To maximize student understanding current and cumulative topics will be assessed weekly.
This unit is sequenced to begin with an informal assessment of prior knowledge of topics within the unit and determine any misconceptions. Students will then build small concrete blocks of information pertinent to mastery of this unit. Finally, students will be asked to use this information to evaluate higher-level problems. This unit will end with a formal assessment common to all honors students.

Common Misconceptions
Students often have problems understanding the difference between cloning and creating transgenic organisms. To help resolve this we go over a few examples and they work together to determine which is which.
Students also have trouble defining “living”. In this chapter we explore a few properties of yeast and conduct experimentations on them to determine whether or not yeast is a living organism.

Unit Name: Unit 9: Plants form and function
Time Frame: 4 weeks
Author: Egg Harbor Township High School Science Department

UNIT

Subject: HN Science 2.0 Country: **USA**
Course/Grade: 9th State/Group: **NJ**
School: **Egg Harbor Township High School**

UNIT SUMMARY

This unit starts with an introduction to plants and how they are structurally different to animals. Once basic plant structure is covered students will use microscopes and identify plant structures from different slides and eventually create their own model of a plant based on the parts that they have learned about in this unit. Students will also germinate seeds and study the effects of genetic modification to plants and the effects on plant development when plants do not have working chlorophyll.

UNIT RESOURCES

- Videos
- PowerPoint and lecture
- Microscope lab for Edmodo
- Genetically modified Soybeans lab
- Mutant corn lab
- The ultimate plant project
- Plant cell type activity
- Plant transpiration lab (optional)
- Duck weed lab (optional)
- Plant propagation lab (optional)

Internet Resource Links:

- Edmodo.com
- http://www.pbs.org/wgbh/harvest/engineer/select.html
- http://www.pbs.org/wgbh/harvest/engineer/transgen.html
- http://www.nature.com/scitable/topicpage/genetically-modified-organisms-gmos-transgenic-crops-and-732
- http://www.glowingplant.com/

STAGE ONE

GOALS AND STANDARDS

HS-PS1-3 Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.
[Clarification Statement: Emphasis is on understanding the strengths of forces between particles, not on naming specific intermolecular forces (such as dipole-dipole). Examples of particles could include ions, atoms, molecules, and networked materials (such as graphite). Examples of bulk properties of

substances could include the melting point and boiling point, vapor pressure, and surface tension.] [Assessment Boundary: Assessment does not include Raoult's law calculations of vapor pressure.]

HS-LS1-1. Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells. [Assessment Boundary: Assessment does not include identification of specific cell or tissue types, whole body systems, specific protein structures and functions, or the biochemistry of protein synthesis.]

HS-LS1-2 Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. [Clarification Statement: Emphasis is on functions at the organism system level such as nutrient uptake, water delivery, and organism movement in response to neural stimuli. An example of an interacting system could be an artery depending on the proper function of elastic tissue and smooth muscle to regulate and deliver the proper amount of blood within the circulatory system.] [Assessment Boundary: Assessment does not include interactions and functions at the molecular or chemical reaction level.]

LS1.A: Structure and Function Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)

Developing and Using Models Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed world. Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-LS1-2)

HS-LS1-3 Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. [Clarification Statement: Examples of investigations could include heart rate response to exercise, stomata response to moisture and temperature, and root development in response to water levels.] [Assessment Boundary: Assessment does not include the cellular processes involved in the feedback mechanism.]

LS1.A: Structure and Function Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3) Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. (HS-LS1-3)

HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy. [Clarification Statement: Emphasis is on illustrating inputs and outputs of matter and the transfer and transformation of energy in photosynthesis by plants and other photosynthesizing organisms. Examples of models could include diagrams, chemical equations, and conceptual models.] [Assessment Boundary: Assessment does not include specific biochemical steps.]

HS-LS1-6. Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.[Clarification Statement: Emphasis is on using evidence from models and simulations to support explanations.] [Assessment Boundary: Assessment does not include the details of the specific chemical reactions or identification of macromolecules.]

HS-LS1-7 Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are

formed resulting in a net transfer of energy. [Clarification Statement: Emphasis is on the conceptual understanding of the inputs and outputs of the process of cellular respiration.] [Assessment Boundary: Assessment should not include identification of the steps or specific processes involved in cellular respiration.]

HS-LS2-5. Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere. [Clarification Statement: Examples of models could include simulations and mathematical models.] [Assessment Boundary: Assessment does not include the specific chemical steps of photosynthesis and respiration.]

All units:

RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. (HS-PS1-1)
RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-PS1-3), (HS-PS2-6)
WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-PS2-6)
WHST.9-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (HS- PS1-3)
WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. (HS-PS1-3) Draw evidence from informational texts to support analysis, reflection, and research. (HS-PS1-3)
MP.4 Model with mathematics.
HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-PS1-3), (HS-PS1-8), (HS-PS2-6)
HSN-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-PS1-8), (HS-PS2-6)
HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-PS1-3), (HS-PS1-8), (HS-PS2-6)
WHST.9-12.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. (HS-PS1-2)
MP.2 Reason abstractly and quantitatively. (HS-PS3-1), (HS-PS3-2), (HS-PS3-3), (HS-PS3-4), (HS-PS3-5)
SL.11-12.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. (HS-PS3-1), (HS-PS3-2), (HS-PS3-5)
WHST.9012.9 Draw evidence from informational texts to support analysis, reflection, and research. (HS-PS3-4), (HS-PS3-5)
HSA.CED.A.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. (HS-PS4-1), (HS-PS4-3)

UNDERSTANDINGS

1. Students will gain an understanding of plant structure and how they differ from animals.
2. Students will gain an understanding of light microscopy and be able to identify plant structures from different slides.

3. Students will gain an understanding of how all the parts of a plant work together and create their own model of a plant.
4. Students will also gain an understanding of plant development by germinating plants and studying the effects of genetic modification and the effects on plant development when plants do not have working chlorophyll.

ESSENTIAL QUESTIONS

1. How do plants acquire all the elements necessary for survival?
2. How do plants grow?
3. How does reproduction occur in flowering plants?
4. Why is genomics important?
5. How do plants acquire all the elements necessary for survival?
6. How do nutrients and water move in plants?
7. How are symbiotic relationships mutually beneficial?

KNOWLEDGE AND SKILLS

SWBAT:

- Students will be able to explain how people have manipulated plants in the past and how they are doing it now with DNA technology.
- Students will be able explain the two major groups of plants.
- Students will be able explain the parts of a plant, including the tissue systems.
- Students will be able explain the difference between primary and secondary growth.
- Students will be able explain reproduction of flowering plants.
- Students will be able explain how plants acquire nutrients.
- Students will be able explain how plants acquire nutrients and how fertilizers affect plants.
- Students will be able explain organic farming and nitrogen fixation.

STAGE TWO

PERFORMANCE TASKS

- The dreaded are you studying quizzes 1-4
- Microscope lab for Edmodo
- Genetically modified Soybeans lab
- Mutant corn lab
- The ultimate plant project
- Plant cell type activity
- Quiz on monocot vs. dicot
- Chapter 31 vocab quiz
- Chapter 31 study guide
- Chapter 31 test
- Chapter 32 Vocab quiz
- Chapter 32 study guide
- Chapter 32 test

OTHER EVIDENCE

- Review Activity
- Presentations

STAGE THREE

LEARNING PLAN

- Flashcards and/or drill and practice
- Power point presentations
- Lecture with note taking or guided notes
- Whole and small group discussions
- Laboratory groups
- Inquiry based activities with reflective discussion
- Online models and simulators

Student progress will be measured by formative and summative assessments. To maximize student understanding current and cumulative topics will be assessed weekly.
This unit is sequenced to begin with an informal assessment of prior knowledge of topics within the unit and determine any misconceptions. Students will then build small concrete blocks of information pertinent to mastery of this unit. Finally, students will be asked to use this information to evaluate higher-level problems. This unit will end with a formal assessment common to all honors students.

Common Misconceptions

Students come into this unit with almost no preexisting knowledge about plants misconceptions include that plants don't do much students don't realize that they do react to stimuli, fight off infections and predators, and evolve.

Unit Name: Unit 10 the medical community
Time Frame: 2 weeks
Author: Egg Harbor Township High School Science Department

UNIT

Subject: HN Science 2.0 Country: **USA**
Course/Grade: 9th State/Group: **NJ**
School: **Egg Harbor Township High School**

UNIT SUMMARY
This unit starts by exploring ethics in the medical community and why they are necessary. Students will research the impact treatments have on humans and the environment. The second section goes over biomedical research and resources, including equipment doctors have to help assist them with diagnosing and curing patients. The last section of the unit looks at the future technologies that are currently being researched and other experimental medical techniques.

UNIT RESOURCES

- Videos
- PowerPoint and lecture
- Ethics research project
- Biomedical research assignment
- Future medical technology research

Internet Resource Links:

- Edmodo.com
- http://news.bbc.co.uk/2/hi/health/7376191.stm
- http://news.bbc.co.uk/2/hi/health/7354298.stm
- http://www.huffingtonpost.com/2014/03/14/ethics-of-designer-babies_n_4966189.html
- http://embryo.asu.edu/pages/ethics-designer-babies
- http://edition.cnn.com/2014/02/25/business/10-ways-mobile-technology-will-save-your-life/
- http://www.bbc.com/news/technology-28950201
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STAGE ONE

GOALS AND STANDARDS
HS-PS2-6 Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.* [Clarification Statement: Emphasis is on the attractive and repulsive forces that determine the functioning of the material. Examples could include why electrically conductive materials are often made of metal, flexible but durable materials are made up of long chained molecules, and pharmaceuticals are designed to interact with specific receptors.] [Assessment Boundary: Assessment is limited to provide molecular structures of specific designed materials.]

PS1.A: Structure and Properties of Matter The structure and interactions of matter at the bulk scale are determined by electrical forces within and between atoms. (HS-PS1-3), (secondary to HS-PS2-6)

All units:
RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. (HS-PS1-1)
RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-PS1-3), (HS-PS2-6)

WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-PS2-6)
WHST.9-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (HS- PS1-3)
WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. (HS-PS1-3) Draw evidence from informational texts to support analysis, reflection, and research. (HS-PS1-3)
MP.4 Model with mathematics.
HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-PS1-3), (HS-PS1-8), (HS-PS2-6)
HSN-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-PS1-8), (HS-PS2-6)
HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-PS1-3), (HS-PS1-8), (HS-PS2-6)
WHST.9-12.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. (HS-PS1-2)
MP.2 Reason abstractly and quantitatively. (HS-PS3-1), (HS-PS3-2), (HS-PS3-3), (HS-PS3-4), (HS-PS3-5)
SL.11-12.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. (HS-PS3-1), (HS-PS3-2), (HS-PS3-5)
WHST.9012.9 Draw evidence from informational texts to support analysis, reflection, and research. (HS-PS3-4), (HS-PS3-5)
HSA.CED.A.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. (HS-PS4-1), (HS-PS4-3)

UNDERSTANDINGS

1. Students will gain an understanding of the functions of medical technology and how this knowledge can help treat humans.
2. Students will understand the impact of medical practices on the environment.
3. Students will gain an understanding of the ethical dilemmas that the medical community has to analyze.

ESSENTIAL QUESTIONS

1. What is the function and use of medical technology, and how can this knowledge help humans understand their diagnosis and treatment options?
2. What is the impact (+/-) of medical technologies and therapies, on society, human health, the economy, and the environment?

KNOWLEDGE AND SKILLS

SWBAT:

1. Students will be able to explain what medical ethics are and why they are important to have.
2. Students will be able to explain how medical technologies impact society and the environment.
3. Students will know what scientists and doctors are working on now and what future advances they hope to achieve.

STAGE TWO

PERFORMANCE TASKS

- Ethics research project
- Biomedical research assignment
- Future medical technology research

OTHER EVIDENCE

- Presentations

STAGE THREE

LEARNING PLAN

- Flashcards and/or drill and practice
- Power point presentations
- Lecture with note taking or guided notes
- Whole and small group discussions
- Laboratory groups
- Inquiry based activities with reflective discussion
- Online models and simulators

Student progress will be measured by formative and summative assessments. To maximize student understanding current and cumulative topics will be assessed weekly.
This unit is sequenced to begin with an informal assessment of prior knowledge of topics within the unit and determine any misconceptions. Students will then build small concrete blocks of information pertinent to mastery of this unit. Finally, students will be asked to use this information to evaluate higher-level problems. This unit will end with a formal assessment common to all honors students.

Common Misconceptions

Students often have problems understanding why ethics are important in science and the medical community. By giving the students articles and research projects they can decide what they feel is an ethical decision based on the evidence provided.

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