Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS ●FOSTERING ACHIEVEMENT ● CULTIVATING 21ST CENTURY GLOBAL SKILLS

Course Name: Marine Science

Course Number: 045300

Unit 1: The Physical Ocean

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: **Marine Science:** *The Physical Ocean* **Grade Level(s):** 11 & 12	**Unit Summary**: In this unit students will explore the physical characteristics of the world ocean. Students will be able to identify various bodies of water, describe the shape and formations of the seafloor, and explain how they were created. Students will also explore the physical and chemical properties of seawater and describe factors that influence the ocean's tides, currents, and waves.
Essential Question(s): • What are the major oceans and how where they formed? • What is the difference between an ocean and a sea? • What does the seafloor look like? • How do the physical characteristics of ocean water (salinity, temperature, transparency, density, etc) affect marine environments? • How are global ocean and density currents created? • What are some of the factors that create different types of waves? • What forces generate tides?	**Enduring Understanding(s):** • Oceans are a continuous mass of water that cover nearly 71% of the Earth's surface and provide the largest habitats on the planet. These are divided into four major regions; Atlantic, Pacific, Indian, and Arctic. • Seas are smaller (relatively speaking) subdivisions of of salt water that are essentially landlocked. • The seafloor is constantly changing as a result of various subduction zones and can be better explained using the theory of plate tectonics. • The unique physical and chemical properties of water make it a critical component of all living cells, as well as provides a stable habitat for many organisms. • The exchange of energy between the world ocean and the atmosphere produce winds that drive ocean currents. • Waves are produced by various forces that act upon the surface of a body of water. • The gravitational pull of the moon and sun produce a range of varying tides in large bodies of water.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

Learning Target	**NJCCCS or CCS**
1. Identify and label the major oceans, seas, and gulfs on a world map	**1.** HS-ESS2-1 **Other:** MP.2; HSN.Q.A.1; SL.11-12.5,
2. Discriminate among the structures of the seafloor (ridges, subduction zones, abyssal plains, trenches, etc.)	**2.** HS-ESS2-1; HS-ESS1-5 **Other:** RST.11-12.1; HSN-Q.A.3
3. Analyze evidence of plate tectonics and seafloor spreading.	**3.** HS-ESS2-1; HS-ESS1-5 **Other:** RST.11-12.1; HSN-Q.A.3 ; MP.2
4. Describe the basic physical properties of seawater (salinity, transparency, density, etc.)	**4.** HS-ESS3-1 **Other:** RST.11-12.1; HSN-Q.A.3 ; MP.2
5. Explain the basic chemical composition of seawater and the sources of salinity variations.	**5.** HS-ESS3-1 **Other:** RST.11-12.1; HSN-Q.A.3; MP.2
6. Create a sample of seawater in order to build a marine environment in an aquarium.	**6.** HS-ESS3-1 **Other:** RST.11-12.1; HSN-Q.A.3; MP.2
7. Explain the Coriolis effect and describe how it and wind patterns create ocean currents.	**7.** HS-ESS2-5 **Other:** MP.2; HSN.Q.A.1; SL.11-12.5
8. Predict the biological impact of ocean currents on various marine environments.	**8.** HS-ESS2-7 **Other:** WHST.9-12.1
9. Identify the properties and types of waves.	**9.** HS-PS4-5; HS-ESS2-2 **Other:** RST.11-12.1; RST.11-12.2; RST.11-12.8 MP.2; HSN.Q.A.3
10. Describe how gravitational pull of the sun and moon create tides.	**10.** HS-ESS2-5 **Other:** MP.2; HSN.Q.A.1; SL.11-12.5
11. Evaluate the effects of the tides on various marine environments.	**11.** HS-ESS2-7 **Other:** WHST.9-12.1

Inter-Disciplinary Connections:

Social Studies (SOC.9-12.6.1.12.B.1.a)- Discuss the various historical expeditions used to explore and map the world oceans.
Art (VPA.1.3.12.D.2)- Draw a diagram of the features of the sea floor.
Language Arts (See standards attached above as "other")- Various reading and writing activities
Technology (TECH.8.1.12.A)- use various computer programs to conduct, organize, and present subject matter

Students will engage with the following text:

- "*Introduction to Marine Biology"* Karleskint, Turner, Small
- "*Marine Science*" Greene
- Other scientific text from web resources such as NOAA.gov and ocean-institute.org

Students will write:

- Via write to learn activities such as warm up or exit tickets
- Open ended responses on various assessments
- Current events where students will write an analysis of a particular article linking various concepts learned including the problem solving process of scientific method and development of new technology to real life events.
- Utilization of Cornell notes on a regular basis to write questions and summaries pertaining to information they have learned in class
- Lab reports in a standard format or conclusion essays may be required for certain lab activities
- Compose a short story depicting the relationship between the moon and the tide, the wind and surface current, or other relevant topics.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

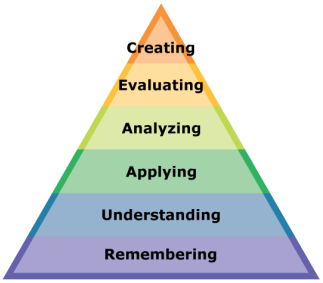
<u>How</u> will students uncover content and build skills.

Students will:

- Engage in textbook and other reading materials as described above
- Actively participate in class discussions both teacher and peer initiated
- Work collaboratively with peers on various assignments, labs, and/or projects
- Create various visual aids in the form of posters, diagrams, etc. (see assessment section for further detail)
- Conduct research using library and internet resources
- Complete write to learn activities
- Create a seawater aquarium
- Conduct an experiment to determine the salinity and pH of a sample of seawater.
- Write a short story or compose a cartoon depicting the relationship between factors that effect the tides, currents, or waves.

Teacher will:

- Utilize Smartboard and PowerPoint technologies to present definitions, concepts and any other pertinent materials
- Use leading questions to spark classroom discussion
- Provide graphic organizers
- Include media such as Youtube and other animations to connect concepts to real life applications or to further appeal to audio-visual learners.
- Perform demonstrations to show physical / chemical characteristics of seawater



PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS. IDENTIFY BLOOM'S LEVELS.

Formative Assessments:

Formative assessments will be in the form of periodic quizzes, lab exercises and extemporaneous teacher evaluations during class such as various concept reinforcement worksheets, monitoring group discussions, and hands on activities.

Examples Include:

- World Map Label and Coloring Exercise *(Remembering, Understanding)*
- Waves and Tides Virtual Lab Activity *(Understanding, Applying, Analyzing, Evaluating)*
- Composition of Seawater Quiz *(Remembering, Understanding, Applying, Analyzing, Evaluating)*

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flashcards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Summative Assessments:

- Students will be required to take a unit exam to demonstrate proficiency *(Remembering, Understanding, Applying, Analyzing, Evaluating)*
- Complete formal lab report *(Understanding, Applying, Analyzing, Evaluating)*

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website adjust length of assignments as needed, modify supplemental materials for readability.

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or media via on-course website monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Performance Assessments:

- Flipped classroom experiences *(Remembering, Understanding, Applying, Evaluating, Creating)*
- Develop a demonstration to show how oceans change and shape coastline *(Remembering, Understanding, Applying, Analyzing, Creating)*
- Create a working "mobile" to illustrate factors and how these factors effect tides *(Understanding, Applying, Analyzing, Creating)*
- Create a child's book or cartoon to demonstrate understanding of materials *(Understanding, Applying, Analyzing, Evaluating, Creating)*

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flashcards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Unit 2: Microorganisms

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<table>
<tr>
<td>Course/Unit Title:
Marine Biology
Grade Level(s):
11-12</td>
<td>Unit Summary:
In this unit, students will be exposed to microorganisms, their characteristics, and the roles they play in marine environments. The purpose of the unit is to serve as a basis for further study of the structure within the oceanic ecosystems. Students will learn that even the smallest of living things can have far reaching effects.</td>
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<tr>
<td>Essential Question(s):
1. How do bacteria fit into a(n): 1. Ocean? 2. Pond? 3. Forest? 4. garden ecosystem?
2. Would you place Volvox in the Protist, or Plant kingdom?
3. In the relationship between flatworm & internal algae, how does each species benefit?
4. What advantages might a simple colony of cells have over independently living cells?
5. What advantage might Volvox gain from its very elaborate form of sexual reproduction?</td>
<td>Enduring Understanding(s):
Viruses are more abundant than other microbes in the sea. Marine planktonic viruses are icosahedral and lytic, and are responsible for the death of many bacteria and phytoplankton in the epipelagic zone. Through this process, viruses play a significant role in marine food chains and in the cycling of mineral nutrients in the sea. Many emerging diseases of marine animals are caused by viruses.

Bacteria have cells with a simple, prokaryotic organization. Chemosynthetic and photosynthetic bacteria extract inorganic nutrients, such as nitrogen, phosphorus, and carbon dioxide, from the environment and incorporate them into organic molecules. Such primary producers as well as heterotrophic bacteria form the base of marine food webs. In addition, marine bacteria play a critical role in nitrogen fixation and nitrification. As decomposers, bacteria return dead organic matter to biogeochemical cycles as inorganic matter that primary producers can incorporate into living biomass.

Like bacteria, archaeons are prokaryotes. Archaeons have an unsurpassed ability in the natural world to tolerate extreme environmental conditions.

Marine fungi are microscopic decomposers and pathogens. Most are sac fungi that can degrade the cell walls of terrestrial, maritime, and marine plants. Marine fungi take advantage of water currents and sea foam for the transport of spores.

In marine environments, nonfungal eukaryotes make up a large portion of the plankton and benthos. Dinoflagellates, diatoms, coccolithophores, and silicoflagellates are photosynthetic producers and members of the phytoplankton. Labyrinthomorphs are decomposers and pathogens. Heterotrophic consumers include ciliates (especially the tintinnids), choanoflagellates, foraminiferans, radiolarians, and some dinoflagellates. Among the consumers, a few groups are grazers of bacteria, allowing for the transfer of prokaryotic biomass to higher levels of marine food webs.</td>
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</table>

	The eukaryotic groups are distinguished by their cell coverings; the structure of their cell membranes; their possession of cilia, flagella, and pseudopods of various shapes for locomotion and prey capture; the chemistry of pigments and food-storage compounds; life-history characteristics; and many other features.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

Learning Target	**NJCCCS or CCS**
● Describe the structure and characteristics of viruses.	.HS-LS1-2; HS-LS2-2; HS-LS4-2 **Other:** SL.11-12.5; RST.11-12.1; WHST.9-12.2
● Interpret a phylogenetic tree of marine organisms.	
● Identify the variety of marine viruses.	
● Describe the structure and characteristics of bacteria.	HS-LS1-2; HS-LS4-2 **Other:** SL.11-12.5; WHST.9-12.2
● Explain the various methods by which bacteria gain nutrition.	
● Describe nitrification and nitrogen fixation.	
● Recognize the symbiotic relationships that bacteria have with other marine organisms.	HS-LS2-2 ; HS-LS4-2 **Other:** RST.11-12.1; WHST.9-12.2
● Describe the structure and characteristics of archaea.	
● Explain the various methods by which archaea gain nutrition.	
● Describe the structure and characteristics of fungi.	HS-LS1-2 **Other:** SL.11-12.5
● Explain the ecology and physiology of marine fungi.	
● Describe the structure and characteristics of stramenopiles, haptophytes, alveolates, choanoflagellates, and ameboid protozoans.	HS-LS1-2; HS-LS2-2; HS-LS4-2 **Other:** SL.11-12.5; RST.11-12.1; WHST.9-12.2; MP.4
● Explain the ecology and physiology of stramenopiles, haptophytes, alveolates, choanoflagellates, and ameboid protozoans.	
	HS-LS2-2 **Other:** RST.11-12.1; WHST.9-12.2
	HS-LS1-2; HS-LS4-2 **Other:** SL.11-12.5; WHST.9-12.2
	HS-LS4-5; HS-LS4-6 **Other:** RST-11.12.8; WHST.9-12.7; WHST.9-12.9

Inter-Disciplinary Connections:

Art (VPA.1.3.12.D.2)- Create poster that is aesthetically pleasing as well as demonstrates knowledge of subject matter.
Language Arts (See standards attached above as "other")- Various reading and writing activities
Technology (TECH.8.1.12.A)- use various computer programs to conduct, organize, and present subject matter

Students will engage with the following text:

- **"***Introduction to Marine Biology"* Karleskint, Turner, Small
- "*Marine Science*" Greene
- Other scientific text from web resources such as NOAA.gov and ocean-institute.org

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. They may include but not be limited to:

<u>Accommodations/Modifications</u>

Make copies and highlight the required reading, allow extra time for reading, give reading materials in advance, provide daily guided questions a day ahead of time in order for the student to participate in class, if students are reading to complete guided notes then provide page number and paragraph next to each blank space. Provide student with written summary.

<u>Students will write:</u>

Students will write a lab report based on a standard format and graded on a standardized rubric.

Students may be asked to complete current events where they will write an analysis of a particular article linking various concepts learned including the problem solving process of scientific method and development of new technology to real life events.

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. They may include but not be limited to:

<u>Accommodations/Modifications</u>

Discuss the answer to questions when completed to assess comprehension of all students, provide students with guided notes, reduce the length of writing assignments, provide extra time, and provide extra writing space for students who write with large print. Grade more heavily on content - not on spelling/ grammar/mechanics.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

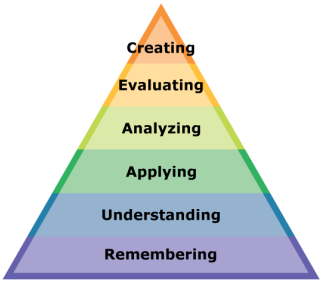
How will students uncover content and build skills.

Students will:

- **Engage in textbook and other reading materials as described above**
- **Actively participate in class discussions both teacher and peer initiated**
- **Work collaboratively with peers on various assignments, labs, and/or projects**
- **Create various visual aids by mapping out the location of various safety equipment in the classroom**
- **Design and conduct laboratory experiments (see example in assessment section)**
- **Safely use microscopes**
- **Build/create wet mount slides**
- **Construct and analyze graphs using student collected and given data**
- **Complete write to learn activities**

Teacher will :

- **Utilize SmartBoard and PowerPoint technologies to present definitions, concepts and any other pertinent materials**
- **Use leading questions to spark classroom discussion**
- **Include media such as You Tube and other animations to connect concepts to real life applications or to further appeal to audio-visual learners.**



PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS. IDENTIFY BLOOM'S LEVELS.

Formative Assessments:

Formative assessments will be in the form of periodic quizzes, lab exercises and extemporaneous teacher evaluations during class such as various concept reinforcement worksheets.

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website or eBoard, adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flash cards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website or eBoard, monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Summative Assessments:

Students will be required to take a test to demonstrate proficiency on the material presented in this unit. Students may also submit formal lab reports.

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website or eBoard, adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flash cards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to

any material or media via on-course website or eBoard, monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Performance Assessments:

Design and conduct laboratory experiments and present conclusions in laboratory reports.

Accommodations/Modifications:

Modifications: Chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website or eBoard, adjust length of assignments as needed, and modify supplemental materials for readability.

Accommodations: provide examples for projects, 1:1 assistance as needed, restate or rephrase instructions, extended time to complete assessment, provide alternate access to any material or media via on-course website or eBoard.

Unit 3: Invertebrates

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Marine Biology/Invertebrates **Grade Level(s):** **11-12**	**Unit Summary**: In this unit, students will study the characteristics of invertebrates. The students will learn about the structure and behavior of porifera, cnidarians, molluscus/cephalopods, arthropods, and Echinodermata. The students will learn about the effects these creatures have on the aquatic ecosystem and the biological impact their behavior may have.
Essential Question(s): 1. What is the texture of a sea sponge? 2. What can sea sponges be used for? 3. What structures do you expect to see when you examine an echinoderm? 4. Can you find the madreporite? 5. Which side is the posterior and which side is the anterior on the starfish? 6. What anatomical similarities are similar in all cnidarians? 7. What is the life cycle of a jellyfish? 8. What is the life cycle of an anemone? 9. Where on the planet would you expect to find a coral reef? 10. What kinds of animals would you expect to see if you were to visit a coral reef? 11. What is interdependence?	**Enduring Understanding(s):** 1. Sponges depend on their ability to filter large amounts of water through their bodies to survive. Their bodies are asymmetrical and contain several cell types that perform specific functions. 2. Sponges provide habitats for many organisms and play a role in recycling calcium. 3. Cnidarians and ctenophores exhibit radial symmetry. 4. Cnidarians have evolved a highly specialized stinging cell that they use for capturing prey and for defense. Ctenophores lack the stinging cell of cnidarians and move by rows of cilia called comb plates. 5. Marine worms display bilateral symmetry and cephalization. 6. The phylum Mollusca includes chitons, tusk shells, gastropods, bivalves, and cephalopods. The generalized molluscan body plan consists of two parts: a head-foot and a visceral mass. 7. Arthropods are the most successful group of animals. They have an exoskeleton, jointed appendages, and sophisticated sense organs. 8. Echinoderms exhibit radial symmetry as adults, although their larvae exhibit bilateral symmetry, suggesting that they evolved from bilateral ancestors. Echinoderms have an internal skeleton and a unique water vascular system that functions in locomotion and food gathering. Echinoderms are represented by sea stars, brittle stars, sea urchins, sea cucumbers, feather stars, and sea lilies (crinoids). 9. Tunicates have bodies that are covered with a tunic composed of molecules similar to cellulose. 10. Cephalochordates, also known as lancelets, are small animals that resemble eels. They are found in the bottom sediments along coastal areas where they filter food from the water. 11. Arrowworms are predatory members of the zooplankton that feed on a variety of pelagic animals, including small fish.

12. In what ways are humans impacting the reproductive methods of coral reefs?	

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

Learning Target	**NJCCCS or CCS**
1. Describe the anatomy and physiology of sponges.	.HS-LS1-2; HS-LS2-2; HS-LS4-2 **Other:** SL.11-12.5; RST.11-12.1; WHST.9-12.2
2. Recognize the ecological and economic roles of sponges.	
3. Describe the anatomy and physiology of cnidarians.	
4. Discuss the specialized stinging cells of cnidarians.	
5. Recognize the ecological roles of cnidarians.	HS-LS1-2; HS-LS4-2 **Other:** SL.11-12.5; WHST.9-12.2
6. Describe the anatomy and physiology of ctenophores.	
7. Recognize the ecological roles of ctenophores.	
8. Explain bilateral symmetry and its evolution.	HS-LS2-2 ; HS-LS4-2 **Other:** RST.11-12.1; WHST.9-12.2
9. Describe the anatomy and physiology of flatworms, ribbon worms, and lophophorates.	
10. Recognize the ecological roles of flatworms, ribbon worms, and lophophorates.	HS-LS1-2 **Other:** SL.11-12.5
11. Describe the anatomy and physiology of molluscs, annelids, and nematodes.	
12. Recognize the ecological roles of molluscs and marine worms.	HS-LS1-2; HS-LS2-2; HS-LS4-2 **Other:** SL.11-12.5; RST.11-12.1; WHST.9-12.2; MP.4
13. Describe the anatomy and physiology of arthropods.	
14. Recognize the ecological roles of arthropods.	
15. Describe the anatomy and physiology of arrowworms and echinoderms.	
16. Recognize the ecological roles of arrowworms and echinoderms.	
17. Describe the anatomy and physiology of hemichordates and invertebrate chordates.	HS-LS2-2 **Other:** RST.11-12.1; WHST.9-12.2
18. Recognize the ecological roles of hemichordates and invertebrate chordates.	HS-LS1-2; HS-LS4-2 **Other:** SL.11-12.5; WHST.9-12.2
	HS-LS4-5; HS-LS4-6 **Other:** RST-11.12.8; WHST.9-12.7; WHST.9-12.9

Inter-Disciplinary Connections:

Social Studies (SOC.9-12.6.2.12.C.6.b) - Discuss economic value of certain species of fish.
Art (VPA.1.3.12.D.2)- Create poster that is aesthetically pleasing as well as demonstrates knowledge of subject matter.
Language Arts (See standards attached above as "other")- Various reading and writing activities
Technology (TECH.8.1.12.A)- use various computer programs to conduct, organize, and present subject matter

Students will engage with the following text:

- **"***Introduction to Marine Biology"* Karleskint, Turner, Small
- "*Marine Science*" Greene
- Other scientific text from web resources such as NOAA.gov and ocean-institute.org

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. They may include but not be limited to:

<u>Accommodations/Modifications</u>

Make copies and highlight the required reading, allow extra time for reading, give reading materials in advance, provide daily guided questions a day ahead of time in order for the student to participate in class, if students are reading to complete guided notes then provide page number and paragraph next to each blank space. Provide student with written summary.

<u>Students will write:</u>

Students will write a lab report based on a standard format

Rubric

Students may be asked to complete current events where they will write an analysis of a particular article linking various concepts learned including the problem solving process of scientific method and development of new technology to real life events.

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. They may include but not be limited to:

<u>Accommodations/Modifications</u>

Discuss the answer to questions when completed to assess comprehension of all students, provide students with guided notes, reduce the length of writing assignments, provide extra time, and provide extra writing space for students who write with large print. Grade more heavily on content - not on spelling/ grammar/mechanics.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

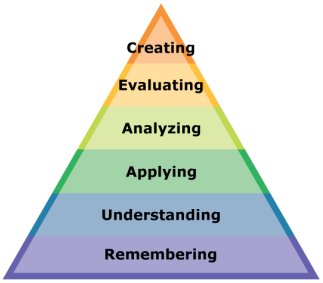
DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

- **Engage in textbook and other reading materials as described above**
- **Actively participate in class discussions both teacher and peer initiated**
- **Work collaboratively with peers on various assignments, labs, and/or projects**
- **Create various visual aids by mapping out the location of various safety equipment in the classroom**
- **Design and conduct laboratory experiments (see example in assessment section)**
- **Safely use microscopes**
- **Build/create wet mount slides**
- **Construct and analyze graphs using student collected and given data**
- **Complete write to learn activities**

Teacher will :

- **Utilize SmartBoard and PowerPoint technologies to present definitions, concepts and any other pertinent materials**
- **Use leading questions to spark classroom discussion**
- **Include media such as You Tube and other animations to connect concepts to real life applications or to further appeal to audio-visual learners.**



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Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website or eBoard, adjust length of assignments as needed, modify supplemental materials for readability.

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Summative Assessments:

Students will be required to take a test to demonstrate proficiency on the material presented in this unit. Students may also submit formal lab reports.

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website or eBoard, adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flash cards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website or eBoard, monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Performance Assessments:

Design and conduct laboratory experiments and present conclusions in laboratory reports.

Accommodations/Modifications:

Modifications: Chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website or eBoard, adjust length of assignments as needed, and modify supplemental materials for readability.

Accommodations: provide examples for projects, 1:1 assistance as needed, restate or rephrase instructions, extended time to complete assessment, provide alternate access to any material or media via on-course website or eBoard.

Unit 4: Fish and Marine Reptiles

PART I: UNIT RATIONALE

<u>WHY</u> ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<table>
<tr><td>Course/Unit Title:
Marine Science: Fish and Marine Reptiles
Grade Level(s):
11 & 12</td><td>Unit Summary:
In this unit students will become familiar with the major classes of marine fishes and reptiles that live in the sea. Students will recognize and be able to discuss the basic biology and adaptations of these organisms.</td></tr>
<tr><td>Essential Question(s):
● What are the major groups of marine fishes and what factors are used to distinguish between them?
● What are some of the adaptations fish have developed to survive in their environments
● What kinds of reptiles live in the marine environments?
● What adaptations do reptiles have to live in marine environments?
● Why are so many sea turtle species endangered?</td><td>Enduring Understanding(s):
● Oceans are inhabited by 3 major categories of fishes; jawless fish (hagfish and lampreys), cartilaginous fishes (sharks and rays), and bony fishes (lobefins and ray-finned fishes). These categories are richly diverse characterized using many different factors.
● Fishes have evolved a variety of adaptations in anatomy, physiology, and behaviors to meet the challenges of living in the ocean.
● Saltwater crocodiles, marine iguanas, turtles, and over 65 species of snakes make their homes in marine environments.
● Adaptations such as amniotic eggs, more efficient respiratory and circulatory systems have helped reptiles to survive on both land and in the sea.
● Six of the seven species of marine turtles are threatened by human activity such as pollution, poaching, and destruction of beach nesting sites.</td></tr>
</table>

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

Learning Target	**NJCCCS or CCS**
1. Identify and summarize the characteristics of the major groups of marine fishes.	**1.** HS-LS1-2; HS-LS2-2; HS-LS4-2 **Other:** SL.11-12.5; RST.11-12.1; WHST.9-12.2
2. Identify and compare jawless fishes	**2.** HS-LS1-2; HS-LS4-2 **Other:** SL.11-12.5; WHST.9-12.2
3. Explain shark behaviors and discuss the risks and occurrences of human interactions.	**3.** HS-LS2-2 ; HS-LS4-2 **Other:** RST.11-12.1; WHST.9-12.2
4. Diagram and explain the basic anatomical features of selected fish (ie. Sharks, certain bony fishes)	**4.**HS-LS1-2 **Other:** SL.11-12.5
5. Explain important morphological features, behaviors, and other adaptations of various marine fishes.	**5.** HS-LS1-2; HS-LS2-2; HS-LS4-2 **Other:** SL.11-12.5; RST.11-12.1; WHST.9-12.2; MP.4
6. List and describe the types of reptiles found in marine environments.	**6.** HS-LS2-2 **Other:** RST.11-12.1; WHST.9-12.2
7. Describe special adaptations marine reptiles have for living in the sea.	**7.** HS-LS1-2; HS-LS4-2 **Other:** SL.11-12.5; WHST.9-12.2
8. Explain why sea turtles are endangered and hypothesize solutions for conservation.	**8.**HS-LS4-5; HS-LS4-6 **Other:** RST-11.12.8; WHST.9-12.7; WHST.9-12.9

Inter-Disciplinary Connections:

Social Studies (SOC.9-12.6.2.12.C.6.b) - Discuss economic value of certain species of fish.
Art (VPA.1.3.12.D.2)- Create poster that is aesthetically pleasing as well as demonstrates knowledge of subject matter.
Language Arts (See standards attached above as "other")- Various reading and writing activities
Technology (TECH.8.1.12.A)- use various computer programs to conduct, organize, and present subject matter

Students will engage with the following text:

- **"***Introduction to Marine Biology"* Karleskint, Turner, Small
- "*Marine Science*" Greene
- Other scientific text from web resources such as NOAA.gov and ocean-institute.org

Students will write:

- Via write to learn activities such as warm up or exit tickets
- Open ended responses on various assessments
- Current events where students will write an analysis of a particular article linking various concepts learned including the problem solving process of scientific method and development of new technology to real life events.
- Utilization of Cornell notes on a regular basis to write questions and summaries pertaining to information they have learned in class
- Lab reports in a standard format or conclusion essays may be required for certain lab activities

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

Students will:

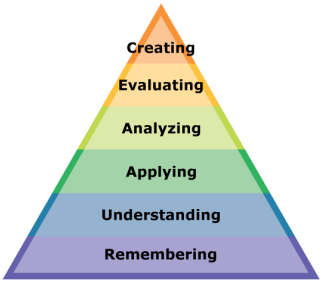
- Engage in textbook and other reading materials as described above
- Actively participate in class discussions both teacher and peer initiated
- Work collaboratively with peers on various assignments, labs, and/or projects
- Create various visual aids in the form of posters, diagrams, etc. (see assessment section for further detail)
- Conduct research using library and internet resources
- Complete write to learn activities

Teacher will:

- Utilize Smartboard and PowerPoint technologies to present definitions, concepts and any other pertinent materials
- Use leading questions to spark classroom discussion
- Provide graphic organizers
- Include media such as Youtube and other animations to connect concepts to real life applications or to further appeal to audio-visual learners.
- Provide student with educational text and guidelines to help students evaluate this text.

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS. IDENTIFY BLOOM'S LEVELS.



Formative Assessments:

Formative assessments will be in the form of periodic quizzes, lab exercises and extemporaneous teacher evaluations during class such as various concept reinforcement worksheets, monitoring group discussions, and hands on activities.

Examples include:

- Fish Niche Activity *(Understanding, Applying)*
- Fishes Quiz *(Remembering, Understanding, Applying, Evaluating)*
- Dogfish Shark Dissection *(Remembering, Applying)*

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flashcards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Summative Assessments:

- Students will be required to take a unit exam to demonstrate proficiency *(Remembering, Understanding, Applying, Analyzing, Evaluating)*
- Complete formal lab report *(Understanding, Applying, Analyzing, Evaluating)*
- Complete a current event / research assignment *(Understanding, Applying, Analyzing, Evaluating, Creating)*

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, extended time to complete assessment, provide alternate access to any material or media via on-course website

monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Performance Assessments:

- Flipped classroom experiences *(Remembering, Understanding, Applying, Evaluating, Creating)*
- Create a "Wanted" style poster to demonstrate knowledge of fish biology *(Understanding, Applying, Analyzing, Evaluating, Creating)*

Accommodations/Modifications:

Modifications: Modify laboratory reports by providing a template on on-course website adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flashcards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Unit 5: Marine Environments

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<table>
<tr>
<td>Course/Unit Title:
Marine Science: Marine Environments
Grade Level(s):
11 & 12</td>
<td>Unit Summary:
In this unit focuses on different marine environments such as intertidal communities, estuaries, coral reefs, continental shelves, and oceanic zones. Topics will include physical and biological parameters of these environments.</td>
</tr>
<tr>
<td>Essential Question(s):
● What are the various marine zones and how do the organisms that inhabit them interact?
● What are some of the adaptations used by organisms in order to survive their environments?
● What factors (both biotic and abiotic) make an estuary such a productive marine environment?
● How are coral reefs formed, and how do they differ in the Atlantic and Pacific Oceans?
● How do the various marine environments compare?</td>
<td>Enduring Understanding(s):
● The environment is a complex assemblage of interacting and evolving chemical, physical, and biological processes.
● The current state of the environment is maintained by the processes that dictate its nature. Changes to any of the processes will impact the state of the environment.
● The various zones of the ocean differ in their biotic and abiotic composition.
● When compared to the other marine communities the oceanic zone is a biological desert.
● Organisms that are native to the intertidal zone survive in diverse and dynamic conditions impacted by tides and waves.
● Estuaries are highly productive and critical habitats that serve as both a buffer between land and ocean, as well as, a nursery environment for a diverse range of marine organisms.
● Coral reefs are the most biodiverse marine communities and are restricted by specific environmental parameters.</td>
</tr>
</table>

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

Learning Target	**NJCCCS or CCS**
1. Distinguish between the different life zones along the shore and describe the biodiversity that inhabits each.	**1.** HS-ESS2-1; HS-LS2-2 **Other:** MP.2; RST.11-12.1; WHST.9-12.2; HSN.Q.A.1; SL.11-12.5
2. Diagram and label a profile of ocean basins illustrating the major zones.	**2.** HS-ESS2-1 **Other:** MP.2; HSN.Q.A.1; SL.11-12.5,
3. Explain the effects of tides on intertidal zones (temperature change, salinity, and wave energies).	**3.** HS-LS2-3; HS-LS2-4; HS-LS2-6 **Other:** RST.11-12.1; RST.11-12.7; WHST.9-12.5; HSN.Q.A.2; HSS-ID.A.1
4. Recognize the interdependence of organisms found in the intertidal environment.	**4.** HS-LS2-6; HS-LS2-8 **Other:** RST.11-12.1; RST.11-12.7;HSN.Q.A.2; HSS-ID.A.1
5. Outline the unique chemical and physical characteristics of estuaries.	**5.** HS-LS2-2 **Other:** MP.2; RST.11-12.1; WHST.9-12.2; HSN.Q.A.1
6. Identify different types of organisms and their adaptations that allow them to survive in an estuary.	**6.** HS-LS2-6; HS-LS2-8 **Other:** RST.11-12.1; RST.11-12.7;HSN.Q.A.2; HSS-ID.A.1
7. Explain why estuaries function as the ocean's nursery (i.e. nutrients and food sources, protection from predators, calm waters, etc.)	**7.** HS-LS2-1 **Other:** RST.11-12.1; WHST.9-12.2; HSN.Q.A.2; HSS-ID.A.1
8. Demonstrate (via modeling or other methods) how estuaries act as chemical and physical buffer zones (i.e. sediment and pollution filtration, flooding, pH, etc.)	**8.** HS-LS2-2; HS-LS2-4 **Other:** MP.2; RST.11-12.1; WHST.9-12.2; HSN.Q.A.1
9. Identify and explain the organisms and conditions necessary for the development of a coral reef.	**9.** HS-LS2-6; HS-LS2-8 **Other:** RST.11-12.1; RST.11-12.7;HSN.Q.A.2; HSS-ID.A.1
10. List and describe the various types of coral reefs and discuss their locations.	**10.** HS-ESS2-1; HS-LS2-2 **Other:** MP.2; RST.11-12.1; WHST.9-12.2; HSN.Q.A.1; SL.11-12.5
11. Analyze the effects of temperature, salinity, and light on a coral reef.	**11.** HS-LS2-1 **Other:** RST.11-12.1; WHST.9-12.2; HSN.Q.A.2; HSS-ID.A.1

12. Identify and discuss symbiotic relationships between organisms of a coral reef.	**12.** HS-LS2-6; HS-LS2-8 **Other:** RST.11-12.1; RST.11-12.7;HSN.Q.A.2; HSS-ID.A.1

Inter-Disciplinary Connections:

Social Studies (SOC.9-12.6.1.12.B.1.a)- Discuss geologic impact on human civilizations
Art (VPA.1.3.12.D.2)- Draw a diagram of the features of the sea floor.
Language Arts (See standards attached above as "other")- Various reading and writing activities
Technology (TECH.8.1.12.A)- use various computer programs to conduct, organize, and present subject matter

Students will engage with the following text:

- **"***Introduction to Marine Biology"* Karleskint, Turner, Small
- "*Marine Science*" Greene
- Other scientific text from web resources such as NOAA.gov and ocean-institute.org

Students will write:

- Via write to learn activities such as warm up or exit tickets
- Open ended responses on various assessments
- Current events where students will write an analysis of a particular article linking various concepts learned including the problem solving process of scientific method and development of new technology to real life events.
- Utilization of Cornell notes on a regular basis to write questions and summaries pertaining to information they have learned in class
- Lab reports in a standard format or conclusion essays may be required for certain lab activities
- Creation of an instruction manual or pamphlet for tourists to a specific habitat to acquaint them with the environment and convince them to help preserve it.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

Students will:

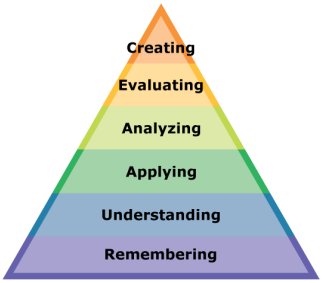
- Engage in textbook and other reading materials as described above
- Actively participate in class discussions both teacher and peer initiated
- Work collaboratively with peers on various assignments, labs, and/or projects
- Create various visual aids in the form of posters, diagrams, etc. (see assessment section for further detail)
- Conduct research using library and internet resources
- Complete write to learn activities
- Construct models of estuaries or coral reef environments

Teacher will:

- Utilize Smartboard and PowerPoint technologies to present definitions, concepts and any other pertinent materials
- Use leading questions to spark classroom discussion
- Provide graphic organizers
- Include media such as Youtube and other animations to connect concepts to real life applications or to further appeal to audio-visual learners.
- Provide students access to manipulative, models, and other educational specimen

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS. IDENTIFY BLOOM'S LEVELS.



Formative Assessments:

Formative assessments will be in the form of periodic quizzes, lab exercises and extemporaneous teacher evaluations during class such as various concept reinforcement worksheets, monitoring group discussions, and hands on activities.

Examples include:

- Examining Beach Sands Activity *(Remembering, Applying, Analyzing, Evaluating)*
- Zones Guided Reading and Coloring Activity *(Remembering, Applying)*
- Environments Concepts Map (includes biotic and abiotic factors and descriptions) *(Remembering, Understanding, Analyzing, Evaluating, Creating)*

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flashcards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Summative Assessments:

- Students will be required to take a unit exam to demonstrate proficiency *(Remembering, Understanding, Applying, Analyzing, Evaluating)*
- Complete formal lab report *(Understanding, Applying, Analyzing, Evaluating)*
- Complete research assignment *(Understanding, Applying, Analyzing, Evaluating, Creating)*

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flashcards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Performance Assessments:

- Flipped classroom experiences *(Remembering, Understanding, Applying, Evaluating, Creating)*
- Creation of an instruction manual or pamphlet for tourists to a specific habitat to acquaint them with the environment and convince them to help preserve it *(Understanding, Applying, Analyzing, Evaluating, Creating)*
- Design an experiment to test various factors that affect marine environments (i.e. – How do pollutants affect a coral reef? Or how can changes in pH effect an estuary?) *(Understanding, Applying, Analyzing, Evaluating, Creating)*

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flashcards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Unit 6: Humans and The Ocean

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<table>
<tr>
<td>Course/Unit Title:
Marine Science: Humans and The Ocean
Grade Level(s):
11 & 12</td>
<td>Unit Summary:
In this unit students will discuss ways in which humans interact with and impact the world ocean. Students will relate natural resources provided by the seas to the global economy, explain human impacts (including pollution and conservation efforts), and research / evaluate sustainable uses of these resources.</td>
</tr>
<tr>
<td>Essential Question(s):
● What resources other than food are harvested from the oceans?
● What impact does fishing have on the environment?
● What are some sustainable uses of ocean resources?
● What are the major sources of pollution in the oceans and what impact do they have on the environment?
● What can be done to preserve marine environments?</td>
<td>Enduring Understanding(s):
● The sea is an important source of minerals (such as salts, manganese), gravel and sand (used to produce concrete and cements), can provide drinking water (after desalination) and contains major fossil fuel and methane energy reserves.
● The increased demand for food from the sea has placed a great deal of pressure on fish and shellfish populations and overfishing has had a negative impact on improperly managed populations.
● Fish, shellfish, salts and water are renewable resources but must be properly managed to produce a sustainable yield.
● Pollutants enter coastal seas by way of agricultural and urban runoff, dumping, oil spills etc. and may accumulate and magnify thus affecting the entire marine community.
● Many groups are working hard to preserve marine environments via community education, clean up, and fundraiser efforts.</td>
</tr>
</table>

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

Learning Target	**NJCCCS or CCS**
1. List and describe the non living resources that come from the oceans.	**1**. HS-LS2-6; HS-ESS3-1 **Other:** RST.11-12.1; MP.2; HSN.Q.A.1
2. Identify various types of food items provided by marine environments	**2.** HS-LS2-6; HS-ESS3-1 **Other:** RST.11-12.1; MP.2; HSN.Q.A.1
3. Utilize case studies to discuss recent problems with ocean fisheries and explain the current attempts for their management.	**3.** HS-LS2-7; HS-ESS3-2 **Other:** RST.9-10.8; RST.11-12.7; RST.11-12.8; WHST.9-12.7; MP.2; HSN.Q.A.1; HSN.Q.A.2; HSN.Q.A.3
4. Develop an understanding of the economic value of marine resources by conducting research.	**4.** HS-LS2-7; HS-ESS3-2 **Other:** RST.9-10.8; RST.11-12.7; RST.11-12.8; WHST.9-12.7; MP.2; HSN.Q.A.1; HSN.Q.A.2; HSN.Q.A.3
5. Identify sources of pollution in the world ocean and discuss the impact these pollutants have on both biotic and abiotic factors of the environment.	**5.** HS-LS2-7; HS-LS4-6; HS-ESS3-6 **Other:** RST.9-10.8; RST.11-12.7; RST.11-12.8; WHST.9-12.7; MP.2; HSN.Q.A.1; HSN.Q.A.2; HSN.Q.A.3
6.Describe marine environment conservation attempts.	**6.** HS-LS2-7; HS-LS4-6; HS-ESS3-6 **Other:** RST.9-10.8; RST.11-12.7; RST.11-12.8; WHST.9-12.7; MP.2; HSN.Q.A.1; HSN.Q.A.2; HSN.Q.A.3
7. Explain the concept of sustainability and develop ideas for using marine resources responsibly.	**7.** HS-LS2-7; HS-LS4-6 **Other:** RST.9-10.8; RST.11-12.7; RST.11-12.8; WHST.9-12.7; MP.2; HSN.Q.A.1; HSN.Q.A.2; HSN.Q.A.3
8. Work collaboratively to create resource management solutions.	**8.** HS-LS2-7; HS-LS4-6 **Other:** RST.9-10.8; RST.11-12.7; RST.11-12.8; WHST.9-12.7; MP.2; HSN.Q.A.1; HSN.Q.A.2; HSN.Q.A.3

Inter-Disciplinary Connections:

Social Studies (SOC.9-12.6.2.12.C.6.b) - Discuss global economic impact of marine resource uses.
Art (VPA.1.3.12.C.2)- Creation of a public service announcement/ skit
Language Arts (See standards attached above as "other")- Various reading and writing activities
Technology (TECH.8.1.12.A)- use various computer programs to conduct, organize, and present subject matter

Students will engage with the following text:

- **"***Introduction to Marine Biology"* Karleskint, Turner, Small
- "*Marine Science*" Greene
- Other scientific text from web resources such as NOAA.gov and ocean-institute.org

Students will write:

- Via write to learn activities such as warm up or exit tickets
- Open ended responses on various assessments
- Current events where students will write an analysis of a particular article linking various concepts learned including the problem solving process of scientific method and development of new technology to real life events.
- Utilization of Cornell notes on a regular basis to write questions and summaries pertaining to information they have learned in class
- Lab reports in a standard format or conclusion essays may be required for certain lab activities
- Write a proposal for an environmental conservation project

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

<u>How</u> will students uncover content and build skills.

Students will:

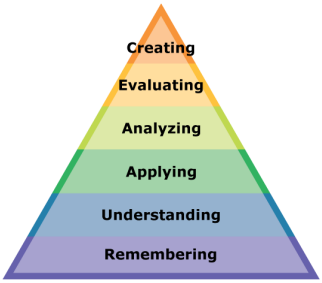
- Engage in textbook and other reading materials as described above
- Actively participate in class discussions both teacher and peer initiated
- Work collaboratively with peers on various assignments, labs, and/or projects
- Create various visual aids in the form of posters, diagrams, etc. (see assessment section for further detail)
- Conduct research using library and internet resources
- Complete write to learn activities
- Participate in a debate or Socratic Seminar on ocean sustainability / conservation efforts

Teacher will:

- Utilize Smartboard and PowerPoint technologies to present definitions, concepts and any other pertinent materials
- Use leading questions to spark classroom discussion
- Provide graphic organizers
- Include media such as Youtube and other animations to connect concepts to real life applications or to further appeal to audio-visual learners.
- Provide student with educational text and guidelines to help students evaluate this text.

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS. IDENTIFY BLOOM'S LEVELS.



Formative Assessments:

Formative assessments will be in the form of periodic quizzes, lab exercises and extemporaneous teacher evaluations during class such as various concept reinforcement worksheets, monitoring group discussions, and hands on activities.

Examples include:

- Fishing Down the Food Chain Activity *(Understanding, Applying, Analyzing)*
- Prepare for and participate in a debate and or Socratic Seminar *(Remembering, Understanding, Analyzing, Evaluating, Creating)*
- Economy and The Ocean Quiz *(Remembering, Understanding, Applying, Analyzing)*
- Fisheries Case Studies *(Understanding, Applying, Evaluating)*

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flashcards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Summative Assessments:

- Students will be required to take a unit exam to demonstrate proficiency *(Remebering , Understanding, Applying, Analyzing, Evaluating)*
- Complete formal lab report *(Understanding, Applying, Analyzing, Evaluating)*
- Complete research assignment *(Understanding, Applying, Analyzing, Evaluating, Creating)*

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flashcards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Performance Assessments:

- Flipped classroom experiences *(Remembering, Understanding, Applying, Evaluating, Creating)*
- Creation of a conservation efforts booklet or public service announcement to raise awareness *(Understanding, Applying, Analyzing, Evaluating, Creating)*
- Collaborate with peers to create a proposal for a sustainability / conservation action project (i.e.: build a aquaponics garden) *(Understanding, Applying, Analyzing, Evaluating, Creating*)

Accommodations/Modifications:

Modifications: Modify laboratory reports by providing a template on on-course website adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flashcards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

HIGHLAND TIMBER CREEK TRITON
SCIENCE DEPARTMENT

SYLLABUS
Marine Science

Course Content

This a half-year elective course designed for students with an interest in marine biology and oceanography. This course provides a solid foundation for students who wish to further their studies in marine science, by providing a brief overview of many of the major concepts related to marine science (see concepts below).

1. Physical Ocean *NGSS: HS-ESS1-5;HS-ESS2-1; HS-ESS2-2; HS-ESS2-5; HS-ESS2-7; HS-ESS3-1; HS-PS4-5*

Locate and describe the world's oceans and seas, summarize the creation of the seafloor and map its physical characteristics. Discuss the physical and chemical properties of seawater, and explain the natural phenomena of currents, tides, and waves. Four weeks; September

2. Microorganisms *NGSS:*

Utilize microscopy to identify and describe the characteristics of various microorganisms associated with the world ocean. Recognize the value of microorganisms and the effects that they have on an entire ecosystem. Two-three weeks; October

3. Invertebrates *NGSS:*

Summarize the general characteristics of invertebrates. Diagram the structure and describe behaviors of porifera, cnidarians, molluscs/cephalopods, arthropods, and echinoderms. Explain the impact these organisms have on their environments Two-three weeks; October- November

4. Fish and Reptiles *NGSS: HS-LS1-2; HS-LS2-2; HS-LS4-2; .HS-LS4-5; HS-LS4-6*

Demonstrate the ability to describe and classify major categories of marine fishes and reptiles. Explain morphological features, behaviors and adaptations of various fish and marine reptiles. Two-three weeks; November- December

5. Marine Environments *NGSS: HS-ESS2-1; HS-LS2-2; HS-LS2-3; HS-LS2-4; HS-LS2-6; HS-LS2-8*

Divide the oceans into various zones, Discuss intertidal zones, estuaries, and coral reefs., Identify, and describe chemical, physical, and biological factors of various marine environments in each of these

environments.. Recognize the interdependence of both abiotic and biotic factors in environments. Four weeks; December - January

6. Human Impacts *NGSS: HS-LS2-6;HS-LS2-7; HS-LS4-6; HS-ESS3-1;HS-ESS3-2; HS-ESS3-6*

Assess human impacts on various marine environments. Explain economic value of marine resources. Discuss sustainable uses of marine resources and conservation efforts. Two weeks; January

Course Expectations and Skills

1. Create and maintain a class notebook
2. Gather, organize, analyze information using a variety of print and non-print resources and develop conclusions supported by evidence in this information.
3. Produce creative projects such as models and posters to generate public awareness about issues facing society
4. Work collaboratively on activities such as inquiry-based experiments and group presentations
5. Identify different types of organisms and environments and explain the interdependence between them.
6. Recognize and discuss human interactions with the world ocean.

Resources

Primary Text: *Introduction to Marine Biology* by Karleskint, Turner, and Small (Cengage Learning)

Supplemental Text: *Marine Science* by Greene (Amsco)

Grading Scale

Practice – 30%

Minor Assessment – 10%

Major Assessment – 40%

Labs – 20%