## Nandua Middle School
### Art Lesson Plan

<table>
<thead>
<tr>
<th>Teacher: Sarah Clark</th>
<th>Date Range: 2 weeks (Feb 17-Feb 28)???</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course: Art</td>
<td>Period: 7-8th grade</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lesson Title: Hyperspectral Imagery Inspired Abstract Paintings</th>
</tr>
</thead>
</table>

**Content Standard(s) of Learning:**
- 7.1 The student will use, and record in a sketchbook/journal, steps of the art-making process, including research, to create works of art.
- 7.2 The student will refine media techniques to demonstrate craftsmanship.
- 7.3 The student will use ideas, concepts, and prior knowledge to solve art-making problems and create works of art.
- 7.6 The student will apply elements of art and principles of design, including the following, to express meaning in works of art:
  - 1. Color—harmonious chromatic relationships
  - 2. Line—contrast, gradation
  - 3. Space—positive, negative
  - 4. Emphasis—focal point, dominance
  - 5. Proportion—actual, exaggerated
- 7.17 The student will analyze, interpret, and evaluate works of art, based on personal and contextual information.
- 8.1 The student will plan for and reflect on the art-making process, using a sketchbook/journal.
- 8.8 The student will select elements of art and principles of design, including the following, to express meaning in works of art:
  - 1. Color—contrasting relationships
  - 2. Value—shading
  - 3. Proportion—scale, ratio relationships
  - 4. Unity—harmony
  - 5. Variety
- 8.9 The student will combine a variety of compositional techniques to create the illusion of space within the picture plane.
- 8.10 The student will use observational and expressive drawing techniques to demonstrate multiple viewpoints (e.g., above, below, front, back).
- 8.20 The student will analyze purposes, values, and meanings of works of art.
- 8.22 The student will formulate a definition of aesthetics as related to art.

### Understandings/goals: (Purpose of the Lesson)

Students will understand that:

Scientists use hyperspectral imagery to identify materials, detect a process, or find objects within a specified sample of landscape. The photos taken in hyperspectral

### Language Objectives: Students will:

1. View and describe the aboveground biomass images provided by scientists working at the Rochester Institute of Technology working on Hog Island.
2. Compare and contrast the visual qualities of the raw camera images and then view the hyperspectral imaging of Hog Island.
imagery (HSI) analyze a wide spectrum of light instead of assigning primary colors to each pixel. These wave length images process information from across the electromagnetic spectrum. By viewing a raw camera image next to a hyperspectral image, one can use the patterns and textures to compare what the human eye perceives vs. the composition of the landscape.

Photography is an art form that requires use of the elements of art and principles of design. Photography can be used as an artist’s tool for creating works in other mediums, such as painting.

By designating a specific color palette to patterns and textures found in the original image, artists can use photographs to create abstract images.

Quote from the Assessment of Salt Marsh Properties using high resolution hyperspectral imagery of Hog Island: “Our results demonstrate (1) the capability to estimate both biomass and plant stressors, and (2) the importance of considering the spatial scale of the imagery when employing remote sensing techniques. These results are significant steps towards establishment of our ability to predict marsh carbon storage and resilience using remote sensing.”

3. Participate in a class discussion about hyperspectral imagery led by guest from the Virginia Coast Reserve LTER.
4. Participate in a class discussion about photography and view works by National Geographic in order to list qualities that make a photograph successful.
5. Practice using digital cameras to compose photographs that show samples of the diversity of plant life on our school grounds.
6. Students will create a map on top of their original photograph using transparent film in order to assign each specific texture and shape a specific color.
7. By tracing the photos of the NMS school grounds, students will create a painting using a limited color palette in order to resemble a painting resembling hyperspectral imagery.
8. Students will line up completed paintings and digital photographs just like the sample of the Hog Island marsh study. Students will view the works as a group and discuss the results.
9. Students will write an artist statement to explain and describe their process of art making as well as express their opinion of the entire process.

Figure 4: Raw camera image and AGB biomass estimates for three marshes; (a, b) established 1850, (c, d) 1974, (e, f) 2011. White boxes indicate region of interest where groundtruth samples were taken.
Stage 2 - Learning Plan

**Activating or Building Prior Knowledge w/Essential Questions:**

Students will use their prior knowledge of photography to learn more about cropping, framing, and composing a photograph. Students will use their knowledge of painting and color mixing to create an abstract work of art directly from their photograph. Students will rely on their prior knowledge of ecosystems and diversity of environments to be successful at composing a photograph that shows a sample of our school grounds. Students will build on their prior knowledge of using a digital camera in order to learn more about taking high quality photographs. Students will use prior knowledge of art vocabulary in talking and writing about the photographs and abstract paintings.

**Learning Activities:**

- Students will-
  - Look at a chart showing digital photos of the landscape on Hog Island next to hyperspectral imagery taken of the exact same sample areas.
  - Discuss reasons scientists use hyperspectral imagery in their research and what benefits from using this technology.
  - Listen to a presentation by a scientist on the specifics of hyperspectral imagery.
  - Compare and contrast the images side by side using art vocabulary and art adjectives.
  - Look at professional photographs taken by National Geographic artists and discuss what elements of art and principles of design are present in the photographs. Cropping, framing, focus, asymmetry, symmetry, and point of view will be discussed using these photographs.
  - Practice taking photos and identify the elements of art and principles of design that are present in the photographs taken of the school grounds.
  - Use transparent film to map out areas with similar patterns, textures, and colors on the photos in order to assign them specific paint colors that will appear in their painting.
  - Create a grid on the photograph using another piece of transparent paper.
  - Create a grid on the canvas.
  - Trace the photograph onto the canvas with pencil using the grid as a guide to help draw in proportion.
  - Paint an abstraction of the photograph by painting with a pre-selected and limited color palette that correlates with the map they created on the original photograph.
  - View the finished photos and paintings side by side just as the samples from Hog Island were first viewed. Participate in a class critique.
  - Discuss the process students just went through to create their work and write artist statements where they can reflect on the finished product.
  - Compare and Contrast what students created with what scientists do using hyperspectral imagery technology. Compare and contrast the finished abstract paintings to the original hyperspectral imagery of Hog Island.

**Modifications for ELLs/Special Education:**

All SPED and ELL students will receive more one on one attention with this project and will be allowed extra time for completing the assignment. They will also receive written directions.
### Stage 3: Assessment Evidence

**Assessments:**
- pre-assessment: a class discussion on photography and teacher will assess how much information needs to be reviewed and taught about cropping, editing, and framing a photograph.
- formative assessment: finished artwork (painting and photograph)
- summative assessment: finished artist statement in which student describes the process and importance of the project

**Timeline:**
- Day 1: Guest speaker from LTER to introduce hyperspectral imagery.
- Day 2: Discussion on photography (using National Geographic images) and independent research on the Nat. Geo website. Students will compile a list of elements and principles they find in the photos.
- Day 3: Practice photography around school grounds attempting to capture the various plant life and ecosystems present on the property.
- Day 4: View photography taken on Smart Board, students will each choose one image to use for their painting. Begin a discussion on limited color palettes and abstractions.
- Day 5: Create a map on the photographs using transparent film to break down different areas of the landscape. Assign each texture and pattern a paint color. Begin painting.
- Day 6: Painting day
- Day 7-8 Painting
- Day 9: Line up images and paintings side by side for class critique
- Day 10: Reflection and artists statements
### Homework:
- Homework is an extension or reinforcement of the learning, students will not necessarily have assigned work for this project. Extra practice taking photos using cell phones or digital cameras will be suggested as helpful.

### Images from National Geographic Shown during photography discussion:
Themes such as cropping, framing, focus, asymmetry, symmetry, and point of view will be discussed using these photographs.

- [Jellyfish Australia-Hamelin Pool](https://www.nationalgeographic.com/photography/photo-of-the-day/2020/01/jellyfish-australia-hamelin-pool/#close)
- [Russia Taiga Snow Train](https://www.nationalgeographic.com/photography/photo-of-the-day/2019/11/russia-taiga-snow-train/)
- [Humpback Whale Pacific Tonga](https://www.nationalgeographic.com/photography/photo-of-the-day/2019/10/humpback-whale-pacific-tonga/)
- [Schooner Sailing Greenland Ice](https://www.nationalgeographic.com/photography/photo-of-the-day/2019/09/schooner-sailing-greenland-ice/)
- [Lions Kenya Tree Climbing](https://www.nationalgeographic.com/photography/photo-of-the-day/2019/09/lions-kenya-tree-climbing/)
- [Couple Love Hands Tennessee](https://www.nationalgeographic.com/photography/photo-of-the-day/2019/08/couple-love-hands-tennessee/)

### *Possible displays and uses for artwork*
Student work will be displayed in the school art show, March 11.
A sample of students work will be matted and framed to display in Oyster, Va at LTER.
A sample of student work will be displayed at the Riverside Shore Memorial Hospital.
A sample of work will be photographed and published- used to spread awareness of hyperspectral imagery.