Diatoms Lesson Plans
Grades: 9-12
Lessons to Accompany mydiatoms.org Project

Unit Duration: 7-10 days
**Extension Lesson included
**Due to the time needed to collect samples, submit them to the Alverson Lab and receive results the following lesson plan may need to be adjusted to fit the needs of your class timeline and students. These lesson plans would best fit as a learning opportunity within the teaching of a larger Ecology Unit.

Materials:

- Access to https://mydiatoms.org/myDiatom_instructions.php
- Pencils
- Sticky notes or access to application such as Jamboard
- See mydiatoms website for collections materials
- Microscope slides and slide covers
- Droppers
- Microscope(s)
- Science Notebook and/or Digital Document to record science work

Performance Expectation:

HS-LS2-6

I can 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.

Science & Engineering Practice:

Engaging in Argument from Evidence

Crosscutting Concept:

Stability & Change

Performance Expectation:

HS-LS2-7

I can design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

Science & Engineering Practice:

Constructing Explanations & Designing Solutions

Crosscutting Concept:

Stability & Change

Day 1

Project the Essential Question or write on the board

Why are microscopic organisms important to an ecosystem?

*Keep this question up and visible throughout the lessons

Materials Needed:

- Science Notebook (hard copy or digital)
- Sticky notes / chart paper -or- Digital application such as Jamboard
- Access to the website below either whole group or on 1:1 devices

Think-Pair-Share	Have students brainstorm and record on paper/notebook/device
Partner	Have students share with a partner
Whole Group	Have students get into a Scientists Circle and share out what they already know and put their answers on sticky notes up on a board/chart paper or record on a digital application such as Jamboard
Prepare for Data Collection	Put students into groups of 2-4 depending on class size Introduce and give time to students to explore the Participate portion of the website - https://mydiatoms.org/myDiatom_instructions.php Instruct students to read parts 1 and 2 and discuss in their groups

Day 2

Project the Essential Question or write on the board

Why are microscopic organisms important to an ecosystem?

*Keep this question up and visible throughout the lessons

Materials Needed:

- Science Notebook (hard copy or digital)
- Sticky notes / chart paper -or- Digital application such as Jamboard
- Access to the website below either whole group or on 1:1 devices
- Data Forms (See Below)

Individual Warm-Up	Have students stop and jot what they talked about and learned yesterday as well as what was discussed as a class
Prepare for Data Collection	Continued from Day 1 if not finished - Introduce and give time to students to explore the Participate portion of the website - https://mydiatoms.org/myDiatom_instructions.php
Whole Group	Facilitate a whole group discussion - where to collect a sample? Brainstorm ideas and write on the board or in a visible area
Class/Teacher	Students can vote or you can choose where to get the samples in your area **You may want to have students watch/read through the website again on how to collect the samples **Here is where you can also have them discuss/write why they want to collect

	these samples. Have students make a prediction as to what they will find and write reasoning for why they are choosing this location **If time does not permit, the teacher can collect the samples and bring into class
Teacher/Class	See website on directions for collection and sending information in to Alverson lab https://www.mydiatoms.org/myDiatom_instructions.php If you are having your class go to the location(s) and collect samples, this can take a few class periods. If you are limited on time, this can be done by the teacher prior to the start of class. Teachers can also incorporate lessons on data collection/ samples / have students fill out the form as you are collecting or in class when you have completed the collection. Sample Data Form (partners or small group): PDF Form to be completed to return with Samples: PDF
WAIT TIME	Information will be returned approximately 3-4 weeks after the samples are received by the lab **Keep a portion of the sample in your classroom to use for stations activity

WHILE WAITING FOR SAMPLES TO BE RETURNED

**While waiting for samples (3-4 weeks to return from the lab):

1. Students can engage in activities below either just before you are to receive the samples back from the lab or immediately following sending the samples into the lab.
2. The wait time may also be used to continue instruction/lessons related to the Performance Expectations, Crosscutting Concepts and Science and Engineering practices listed at the beginning of these plans.
3. Continued work in the unit of Ecology could be done during the wait time as well.

Day 3

Project the Essential Question or write on the board **Why are microscopic organisms important to an ecosystem?** *Keep this question up and visible throughout the lessons Materials Needed: ● Science Notebook (hard copy or digital) ● Sticky notes / chart paper -or- Digital application such as Jamboard ● Access to the website below either whole group or on 1:1 devices ● Data Forms (See Below)	
Individual Warm-Up	Have students stop and jot what they talked about and learned yesterday - or - review what they discussed before the sample was taken and sent to the lab
Group Discussion	Share out with the whole group and discuss/answer any questions that come up
Student Pairs	Have student examine pictures/videos of diatoms in pairs

	Have students discuss and decide with their partners what diatoms they might see in the data received from the Alverson Lab - make predictions and discuss why they think they may see those diatoms in their data Possible Links for photos and videos (do not have to use these specifically) ● https://diatoms.org/what-are-diatoms - includes information on types, classifications, where they can be found, photos, etc.
Student Pairs	Predict - what types of diatoms do you think we will see in our samples? Why? **Encourage students to conduct a Google search on types of diatoms they would encounter in their collections. (For example, if collecting from a pond, students could search for "pond diatoms" or search specifically for their state "Ohio pond water diatoms")
Group	Share out to small group and/or whole class Record predictions / ideas on Chart Paper or digital media
Notebook	Record predictions in Science notebook or digital document

****Set up stations for the next two days before class begins. You will need the portion of the sample you set aside during initial collection or collect again before Day 4.**

Day 4

Project the Essential Question or write on the board

Why are microscopic organisms important to an ecosystem?

*Keep this question up and visible throughout the lessons

Materials Needed:

- Science Notebook (hard copy or digital)
- Sticky notes / chart paper -or- Digital application such as Jamboard
- Access to the website below either whole group or on 1:1 devices
- Stations Materials:
- Microscope or Microscopes
- Slides and Slip Covers
- Collected Sample(s)
- Pipette or Dropper
- Tweezers
- Gloves
- **Teacher can also prepare slides before Stations work to save time
- **Teachers will need to go over with students how to prepare slides with the collected samples
- YouTube tutorial on preparing wet mount slides: https://www.youtube.com/watch?v=yxTFgDe5CEE&t=1s

Student Pairs or Small Group	Have students stop and jot what they talked about what predictions they made yesterday and what evidence they are using to back up their claims
Student Pairs or Small Group	Have pairs go through stations work and record information in their science notebooks and/or digital document **Students are working on Asking Questions, Developing Models and Consensus Building Link to student stations: PDF

Formative Assessment	Use the information gathered, discussions and the student created story to assess students ability to ask questions, create models and analyze information related to diatoms and the surrounding ecosystem
Stations Work	Stations are designed to be done in order ● Have all station materials at each lab station / table group ● Set up a timer and give students time to complete each station ● Students need access to the internet ● Students can record information digitally or in a notebook
Student Pairs Teacher Prep	You can have your students prepare the slides themselves or prepare them ahead of time and have them available for your students
Stations	Have students rotate every 3-4 minutes to look at different slides and sketch/draw what they see. **You may need to give additional time if your students are preparing slides
Student Pairs or Small Group	Have pairs compare/contrast what they saw at each station and work as a group of four and compile their findings in their Science Notebook

Day 5

Project the Essential Question or write on the board

Why are microscopic organisms important to an ecosystem?

*Keep this question up and visible throughout the lessons

Materials Needed:

- Science Notebook (hard copy or digital)
- Sticky notes / chart paper -or- Digital application such as Jamboard
- Access to the website below either whole group or on 1:1 devices
- Stations Materials:
- Microscope or Microscopes
- Slides and Slip Covers
- Collected Sample(s)
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- **Teacher can also prepare slides before Stations work to save time
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Individual Warm-Up	● Think Pair Share on what students learned during station work yesterday
Student Pairs / Small Groups	● Complete Station work from yesterday

Day 6

**When you have received the data results from the Alverson Lab

Project the Essential Question or write on the board **Why are microscopic organisms important to an ecosystem?** *Keep this question up and visible throughout the lessons	
Individual Warm-Up	• Review the models your students created and discussed in the Station work
Student Pairs / Small Groups	• In student pairs or groups, have students click on their data link on the website: https://mydiatoms.org/myDiatom_view.php • Give students time to explore what types of Diatoms were found in your class sample(s) • Give them time to ask questions and wonder! :) • In their Science notebook, have students record their questions and wonderings
Whole Group	• Student Groups / pairs can choose one diatom that was found in the sample and research more information about their diatom at https://diatoms.org/ • Have student groups / pairs present their findings to their classmates • Discuss as a whole group why each of these diatoms is important to your area ecosystem

Day 7

Project the Essential Question or write on the board **Why are microscopic organisms important to an ecosystem?** *Keep this question up and visible throughout the lessons	
Individual Warm-Up	• Review as a whole class your findings yesterday on the variety of diatoms in your sample and how they are important to your local ecosystem
Whole Group	• Discuss as a class what types of ideas they came up with in their Station stories about what would happen if the Diatoms all disappeared from the local ecosystem • Record ideas on chart paper and/or digital application like Jamboard • After ideas are recorded on chart paper, you can introduce an assessment project to the groups (student pairs, small groups or even an individual assessment)
Summative Assessment	• Students will choose one idea/thought/question from the group discussion on what would happen if the Diatoms disappeared from the local ecosystem and create a platform of their choice to present their information to their

	classmates • Possible Choices: Google Slide Deck, PSA, Tri-Fold Board, Video • Students will use previous websites to conduct research as well as information learned in your Ecology Unit • **Extension**: This could also be utilized in conjunction with the Art Teacher to include an artistic rendering of the diatom they chose to focus their research on
Grading Rubric	• Link to rubric that could be used for the summative project: PDF

Extension Project

Performance Expectation:

HS-LS2-7

I can design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

Science & Engineering Practice:

Constructing Explanations & Designing Solutions

Crosscutting Concept:

Stability & Change

Project the Essential Question or write on the board **Why are microscopic organisms important to an ecosystem?** *Keep this question up and visible throughout the lessons	
Project Introduction	• Students will choose one issue related to climate change and how it affects their local ecosystem • Examples: increased flooding, more severe storms, increased temperatures, drought, excessive flooding, etc.
Student Work	• Research Climate Change and its relation to changing weather patterns • https://www.epa.gov/climate-indicators/weather-climate • Using their findings from this research, students will apply this information to their local ecosystem, the positive and negative effects on the ecosystem

	• Students will relate this information to the role of Diatoms in their local ecosystem • Students will devise a solution that will help their local ecosystem prepare/combat negative effects of climate change • Students create and share an infographic that they can use to educate their local community on the effects of climate change and possible outcomes in the future
Project Grading Rubric	PDF