

The Bio/Diversity Project

Lesson 5: Using Excel to Calculate Diversity

Grade Level: 4-12

AZ Science Standard:	Cheat sheet for AZ science standards <i>HS.L4U1.27</i> Obtain, evaluate, and communicate evidence that describes how changes in frequency of inherited traits in a population can lead to biological diversity.
Learning Objectives:	- Students will learn the basics of using Excel for data analysis. - Students will calculate Shannon's Diversity Index using Excel. - Students will compare species diversity between different data sets.
Scientist of the Week:	 Claire Monteleoni - A pioneer in combining climate science and machine learning - Climate scientists collect huge amounts of data. Like temperatures, sea levels, and CO2 levels. - Claire uses machine learning to help make sense of this data and find patterns. - Machine learning is when computers “learn” from data to make smart predictions or decisions. Claire’s work shows how data science can help protect the planet!

Vocabulary	Materials
● Species Diversity: The variety and abundance of species in a given area. ● Shannon's Index (H'): A mathematical formula used to measure species diversity. ● Relative Abundance: The proportion of each species in a dataset. ● Spreadsheet: A tool used for organizing, analyzing, and storing data.	● Excel (or Google Sheets) ● Candy diversity exercise template ● Bird species dataset from campus wildlife cameras ● Projector or screen for Excel demonstration ● Slideshow
Guiding Questions: <i>Guiding Questions:</i> ● <i>How can Excel be used to organize and analyze biodiversity data?</i> ● <i>Why is species diversity important in ecological studies?</i> ● <i>How do we interpret Shannon's Diversity Index?</i>	

Lesson 5: Using Excel to Calculate Diversity

Engage/Introduction

Time: 10-15 minutes

Objective: Introduce students to Excel and data organization

Activity:

1. Ask students: "What do you already know about spreadsheets?"
2. Demonstrate basic Excel functions (cells, rows, columns, formulas)
3. Introduce Shannon's Diversity Index

Explore

Time: 20-30 minutes

Objective: Use Excel to calculate Shannon's Index with candy diversity.

Activity:

1. Demonstrate by calculating the diversity of a candy pack with the class
 2. Hand out candies with different colors to individual students or groups (e.g., Smarties, gummy bears)
 3. Have students count and categorize the candies
 4. Students will input data into the provided Excel template.
 5. Guide students to calculate the diversity of their candies.
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Explain

Time: 15-20 minutes

Objective: Introduce real-world application of diversity calculations.

Activity:

1. Compare results from different student groups
 2. Discuss the importance of diversity in ecology using candy as an analogy
 3. Transition to analyzing real-world data: bird species from wildlife cameras
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Extend

Time: 15 minutes

Objective: Apply Shannon's Index to real ecological data.

Activity:

1. Distribute the bird species dataset (formatted similarly to the candy example)
 2. Students calculate Shannon's Index in Excel using the same steps.
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Evaluate

Prepared by Lily McMullen, January 2025

Time: 5-10 minutes

Objective: Assess student understanding of Excel and biodiversity concepts.

Activity

1. With their groups, students will write on their exit ticket:
 - a. What challenges did you face when using Excel?
 - b. What was the diversity (H) of bird species?