S12845: Soil Ecosystems from Micro to Global Scales

Instructor: Hayley Gadol (s12485-teachers@esp.mit.edu)
Grade Level: 7th through 10th
Time/Location: 1:00-2:30 in 1-379
Course Description: Soil is NOT just dirt! Soils serve many important roles in our lives, including growing the foods we eat and providing support under the buildings we live in. However, soils can be difficult to understand because they are complex and heterogeneous mixtures of many different components. Soils are heterogeneous at all scales, from across latitudes down to sub-micron (smaller than a bacterium) lengths. Throughout this course, students will learn about the basic components of soils and how the complicated interactions of these components influence soil physical, chemical, and biological properties. Students will also complete hands-on activities to understand soil properties in action. Upon completion of this course, students should understand how soils are able to carry out numerous ecosystem services from food production to fighting climate change.

#	Date	Topic	Learning Objective(s)	Activity
1	2/23/19	Introduction to Soils	○ Define soil and its components ○ Examine soil heterogeneity across length scales	Web Soil Survey
2	3/2/19	Soil Physical Properties and Water Flow	○ Identify size fractions of soil particles ○ Understand how particle size distribution influences water flow	Soil Texturing Lab
3	3/9/19	Soil Chemistry	○ Describe soil mineralogy, pH, and organic matter ○ Understand how soil chemical reactions influence soil health and structure	Soils as Water Filters
No class on 3/16/19 (Spark weekend!)				
4	3/23/19	Soil Ecology	○ Identify soil organisms and chemical reactions mediated by organisms ○ Understand how soil biology affects soil physical and chemical properties	Soil in a Jar: Pre-Lab
5	3/30/19	Soil Classification	○ Describe soil horizons ○ Define the twelve soil orders ○ Analyze development and geographic distribution of soil orders	Soil Classification Worksheet
6	4/6/19	Soil and Humans	○ Synthesize concepts from soil chemistry, biology, and physics to understand how soils provide essential ecosystem services	Soil in a Jar: Post-Lab