

Sustainability and Resilience Infusion Project

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Title of Module/Activity

Infusing Sustainability and Resilience Concepts into Soil Resources Online (AGRO/HORT/SOIL 153)

Course Name and Course Number

Soil Resources, AGRO/HORT/SOIL 153 (Online)

Length of Module/Activity

This is a 4-credit course, divided into four units, which are 4 weeks long each. One sustainability module will be incorporated into each unit (to be integrated into current lectures, coursework; development of new assessments or modification of current assessments). Hyperlinks for specific instructional and assessment activities are included in the following section (note, these are first drafts).

Modules/Activities:

Unit 1 – Soil Functions

Primary Learning Outcome(s): Students will be able to identify the five main roles of soil in the global ecosystem and describe the impact of physical, chemical, and biological factors on soil functions.

Key Sustainability Competencies Addressed: Normative and systems thinking competencies

Instructional Strategies: Lecture video(s), readings, weekly virtual lab activities

- Active Learning Strategy - [Jigsaw virtual lab activity](#) about soil functions and properties that impact them

Assessment Strategies:

- Oral questions within the virtual lab activity and [concept map assignment](#) relating and comparing two soil ecosystem functions
- Weekly quizzes (formative), weekly assignments (summative), unit exam, pre- and post-knowledge surveys

Unit 2 – Soil Compaction

Primary Learning Outcome(s): Students will be able to explain how soil compaction impacts the soil's ability to function as (1) a medium for plant growth, (2) a regulator of water supplies, and (3) an engineering or landscaping medium.

Key Sustainability Competencies Addressed: Normative and systems thinking competencies

Instructional Strategies: Lecture video(s), readings, quizzes, assignments, exam

- Active Learning Strategies - [Weekly group worksheet/virtual lab activity](#); Collaborative document assignment

Assessment Strategies:

- Oral questions within virtual lab activity; [collaborative assignment/essay](#) to compare and contrast the impact of compaction on three soil functions, and to summarize management practices that could limit or minimize compaction
- Weekly quizzes (formative), weekly assignments (summative), unit exam, pre- and post-knowledge surveys

2) Unit 3 – Decomposition, C Sequestration and Climate Change

Primary Learning Outcome(s): Students will be able to explain how the effect of environmental conditions (temperature, moisture, pH) on the rate of decomposition and carbon accumulation in soil; and students will be able to develop hypotheses about changes in the rate of decomposition and carbon accumulation due to climate change, and the potential impacts to the morphological, physical, and chemical properties of the soil and its ability to provide various ecosystem functions (medium for plant growth, etc.).

Key Sustainability Competencies Addressed: Normative, anticipatory, and systems thinking competencies

Instructional Strategies: Lecture video(s), readings, weekly virtual lab activities

- Active Learning Strategy - [Weekly group worksheet/virtual lab activity](#)

Assessment Strategy:

- Oral questions within virtual lab activity
- Weekly quizzes (formative), weekly assignments (summative), unit exam, pre- and post-knowledge surveys

3) Unit 4 – Erosion and Land Management

Primary Learning Outcome(s): Students will be able to assess erosion potential of an area using soil properties and conservation practices with the USLE model; students will be able to compare the impacts of onsite and offsite effects of soil erosion on non-soil factors (transportation, economics, water quality, etc.), using a systems thinking approach; and students will be able to provide recommendations about land use and management

practices to meet various ecosystem functions, based on the physical and chemical properties of the soil.

Key Sustainability Competencies Addressed: Normative, critical thinking, and systems thinking competencies

Instructional Strategies: Lecture video(s), readings, weekly virtual lab activities

- Active Learning Strategies - [Weekly group worksheet/virtual lab activity](#);
Collaborative document assignment (two)

Assessment Strategy:

- Oral questions within virtual lab activity; one [collaborative assignment to develop a concept map](#) to compare the impacts of onsite and offsite effects of soil erosion on non-soil factors (transportation, economics, water quality, etc.); second [collaborative assignment/report](#) to provide recommendations about land use and management practices to meet various ecosystem functions, based on the physical and chemical properties of soil in an assigned area of interest (AOI)
- Weekly quizzes (formative), weekly assignments (summative), unit exam, pre- and post-knowledge surveys