

Deserts, plants, and people

10:00 AM-12:00 PM, June 2, 9, 16, 23, 30, and July 7, 2022

Course summary:

Arid and semiarid environments, commonly known as deserts, make up about one third of the earth's land surface and are home to more than one billion people. We will begin this course by discussing the geographical features of desert regions, answering the seemingly simple questions: What is a desert and why do they occur where they do? While humans are maladapted to life in deserts, many other organisms present in these environments exhibit remarkable and compelling adaptations to aridity and other desert-associated conditions. We will investigate examples of these within plants from different desert regions, highlighting the roles of these species within desert ecosystems. Here the key question will be: How do these plants grow and develop in these environments? Significant events in human history occurred in deserts. They also play a role in many issues in contemporary politics, international relations, and natural resource use. We will consider humans and their influences on desert environments focusing on the consequences and sustainability of these actions. We will also address much more challenging questions such as, how does society steward deserts and what are the consequences of failing to do this properly?

Instructor:

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Weeks 1 & 2 (June 2 & 9):

| Topics | Background reading/activities* |
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| 1. Course overview and introduction to the instructor | |
| 2. What is a desert? How are deserts classified? Why do deserts occur where they do? | Chapter 1, <i>Deserts and Desert Environments</i> /How much water has evaporated in the last hour? |

Weeks 3 & 4 (June 16 & 23):

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| 3. Carbon dioxide, water, and plants, and how they are connected. | |
| a. Carbon dioxide in the atmosphere and why it matters. | Website to review: Carbon and climate |
| b. The trade-offs between plant growth and water use. | Website to review: Photosynthesis /How much water did this plant transpire in the last hour? |

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4. How have plants adapted to life in deserts?
- a. Adaptation is driven by evolution via natural selection.
 - b. Local environment effects can be significant.
 - c. A continuum of adaptations to desert environments – examples from the Sonoran Desert.
 - i. Enduring (tolerating) stresses
 - Evergreen shrubs
 - ii. Avoiding stresses
 - Annual plants
 - iii. Enduring or evading stresses
 - Drought-deciduous shrubs
 - Stem photosynthetic shrubs
 - Succulents
 - Perennial grasses
 - Trees/shrubs rooted in perennial water
 - Parasites
 - Air plants
 - Resurrection plants

Website to review: [Evolution and natural selection](#)

(Adaptation examples will involve demonstrations with living plant specimens)

- creosotebush, jojoba
 - California poppy
 - brittlebush, ocotillo, palo verde,
 - *Ephedra*
 - saguaro, agave
 - sprucetop grama, fluff grass
 - mesquite, fan palm
 - mistletoe
 - *Tillandsia*
 - *Selaginella*
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Weeks 5 & 6 (June 30 & July 7):

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5. People and deserts: our perceptions and their importance.
- a. Abrahamic religions and their desert connections
 - b. Insiders and outsiders: Deserts and environmental determinism.
 - c. Warm and dry with a chance of dust: Deserts and the future.

Chapter 5, *The Desert. Lands of Lost Borders.*

Chapter 4, *The Desert. Lands of Lost Borders.*

Chapter 8, *The Desert. Lands of Lost Borders.*

* **Readings are not required.** Students who are particularly interested in additional background may want to use these references – via electronic copies or on-line links which will be made available – to delve deeper into the lecture topics. Lectures will be loosely based on content in these source materials. **Activities will involve experiments, demonstrations, or displays.**

Laty, Julie J. 2009. Introduction: Defining the Desert System. p. 1-13, In: *Deserts and Desert Environments*, Hoboken, GB: Wiley-Blackwell.

Welland, Michael. 2015. *The Desert. Land of Lost Borders*. London: Reaktion Books Ltd.