PSCI 270 Sustainable Agriculture
May 2016

"*Our tools are better than we are, and grow better faster than we do. They suffice to crack the atom, to command the tides, but they do not suffice for the oldest task in human history, to live on a piece of land without spoiling it."* Aldo Leopold*, Engineering and Conservation* (1938)

This course focuses on the physical and political aspects of sustainability. Students will learn the basics of soil science with labs dedicated to soil morphology, soil structure, cation exchange, and the bio-chemistry of composting. With the physical sustainability of the soil as an evaluative lens, students will read and assess a variety of land use case studies. Has the land and soil been used in a sustainable way? What would a truly agricultural sustainability look like?

May 4 Introduction; get acquainted; course goals
Lecture #1: Humans and soil
Film: *Dirt!: The Movie*

May 5 Soil Classification, Texture, Adsorption, and Structure
White, *Principles and Practice of Soil Science*, 3-16; 34-49
Hillel, *Soil in the Environment*, 55-69
Quiz #1

May 6 Lab #1: Testing the Berkeley method/composting lab part 1
Michael Day and Kathleen Shaw, "Biological, Chemical, and Physical Processes of Composting," 17-50
Lab #1 protocol (setting the parameters)
Worster, *Dust Bowl*, 3-43
Lab #1 report due in class May 9

May 7 SPECIAL CLASS EVENT: BUILDING THE PILES

May 9 From rock to the soil community
Lecture #2 The physical, biological, and chemical properties of soil
Bane, *The Permaculture Handbook*, 187-214
Nardi, *Life in the Soil*, 1-22
Quiz #2

May 10 Lab #2: Soil morphology and Moisture lab (detecting soil texture by look and feel) (CNS WN 102)
Bane, *The Permaculture Handbook*, 135-185
Worster, *Dust Bowl*, 44-97
Lab #2 protocol
Lab #2 report due in class May 11

May 11 Soils and the move to agriculture
Manning, *Against the Grain*, 3-84
Bane, *The Permaculture Handbook*, 345-403
Film: *The Grapes of Wrath*

May 12 Living Creatures on the Permaculture Farm
Lecture #3: Soil as a Living Community
Nardi, *Life in the Soil,* 22-78
Bane, *The Permaculture Handbook,* 259-307
Beattie and Ehrlich, *Wild Solutions*, ix-xii, 107-124
Quiz #3

May 13 Lab #3: Composting lab part 2
Poincelot, "The Biochemistry and Methodology of Composting," 2-30
Rateaver, *The Organic Primer Method*, 58-77
Lab #3 protocol
Lab #3 report due in class May 16

May 16 Lab #4: Soil density lab (detecting soil texture by particle size) (CNS WN 102)
Hillel, *Soil in the Environment*, 70-77
Lab #4 protocol
Lab #4 report due in class May 17

May 17 Facing Limits with Center-Pivot Irrigation
Worster, *Dust Bowl*, 148-243
Stewart et al., "Tapping unsustainable groundwater stores for agricultural production in the High Plains Aquifer of Kansas, projections to 2110," 3477-3486
Quiz #4

May 18 Lab #5: Composting lab part 3
Lecture #4: Permaculture as Sustainable Agriculture
Bane, *The Permaculture Handbook*, 3-103
Mark Shepard, *Restoration Agriculture*, 1-38
Lab #5 protocol
Lab #5 report due in class May 19

May 19 Agricultural Policies and Alternatives I
Manning, *Against the Grain,* 85-121
Carlisle, *Lentil Underground*, 1-59
Quiz #5

May 20 Lab #6: pH and cation exchange lab (CNS WN 102)
Lecture #5: Soil Balance and the Impact of CEC on Plant Mineral Content
Albrecht, *Soil Fertility and Animal Health,* 1-18; 39-67
Astera, "The Ideal Soil," 2-30
Lab #6 protocol
Lab #6 report due in class May 23

May 23 Agricultural Policies and Alternatives II
Manning, *Against the Grain,* 123-184
Carlisle, *Lentil Underground*, 60-139

SPECIAL EVENT: *Sustainable: A Documentary*7 PM Beckman Auditorium Ames Library
Q & A with Marty Travis

May 24 Agricultural Policies and Alternatives III
Manning, *Against the Grain,* 184-211
Carlisle, *Lentil Underground,* 140-191
Quiz #6

May 25 Lab #7: Composting lab final
Carlisle, *Lentil Underground*, 191-262
Lab #7 protocol
Lab #7 report due in class May 26

May 25 4-5pm May Term Closing Reception Ames Library (posted results from composting lab)

May 26 Final Exam 9-11am

Required texts

Peter Bane, *The Permaculture Handbook*: *Garden Farming for Town and Country* (Gambriola Island, B.C.: New Society Publishers, 2012)
Liz Carlisle, *Lentil Underground: Renegade Farmers and the Future of Food in America* (New York: Gotham Books, 2015)
Richard Manning, *Against the Grain: How Agriculture has Hijacked Civilization* (New York: North Point Press, 2004)
Donald Worster, *Dust Bowl: The Southern Plains in the 1930s* (Oxford: Oxford University Press, 1979)

Moodle readings (selections from the following texts)

William Albrecht, *Soil Fertility and Animal Health* (Austin: Acers, 2005) 1-18; 39-68
Michael Astera, *The Ideal Soil: A Handbook for the New Agriculture* (2010) selections
Andrew Beattie and Paul R. Ehrlich, *Wild Solutions* (New Haven: Yale University Press, 2001) ix-xii; 107-124
Michael Day and Kathleen Shaw, "Biological, Chemical, and Physical Processes of Composting," 17-50 in *Compost Utilization in Horticultural Cropping Systems* (Boca Raton, Florida: CRP Press, 2001)
Daniel Hillel, *Soil in the Environment: Crucible of Terrestrial Life* (Amsterdam: Academic Press, 2008) selections
James B. Nardi, *Life in the Spoil: A Guide for Naturalists and Gardeners* (Chicago: University of Chicago Press, 2007) 1-78
Raymond P. Poincelot, "The Biochemistry and Methodology of Composting," (Connecticut Experimental Station, 1972)
Bargyla and Gylver Rateaver, *The Organic Primer Method* (Published by the authors: Pauma Valley, Ca., 1973)
Mark Shepard. *Restoration Agriculture: Real-World Permaculture for Farmers* (Austin, Tx.: Acres, 2013)
David Stewart et al., "Tapping unsustainable groundwater stores for agricultural production in the High Plains Aquifer of Kansas, projections to 2110," *Proceedings of the National Academy of Sciences,* E3477-3486, August 26, 2013.
Robert White, *Principles and Practice of Soil Science*: *the Soil as a Natural Resource* 4th Edition (Madden, Ma: Blackwell, 2006) selections

Course grading

Lab reports	30% (Seven reports 5% each; lowest one dropped)
Quizzes	25% (Six quizzes 5% each; lowest one dropped)
Class participation	15%
Final exam	30%

Lab attire

Indoor labs will meet in CNS WN 102 and involve mildly caustic chemicals. For safety reasons, please wear close toe shoes, long pants, and at least a full short sleeve shirt; no tank tops or flip flops.

Outdoor labs will take place rain or shine at the new IWU Peace Garden, which is located at 1208 North Evans (or just south of University Street between Evans and McLean Streets). Be sure to bring a rain jacket and water bottle. Those who prefer gloves should purchase a pair before class; the Peace Garden has some mismatched gloves available. Covered shoes and even boots should be worn to the Peace Garden—no sandals or flip flops.

All other classes will meet in SFH 201.

Professor James Simeone
Office: CLA 251
Telephone: 556-3126
Office hours: 12-1pm M-T-W-TH
Homepage: www.iwu.edu/~jsimeone/menu