ANTH 5330/6330
GEOARCHAEOLOGY
FALL 2017

Lecture: Monday, 3:30-6:00 pm
Old Main 006
Instructor: Judson Finley
Office: Old Main 245F
Phone: (435)797-9621
Email: judson.finley@usu.edu
Office Hours: Monday and Wednesday 10:00-11:30, or by appointment

Course Fee: $25.00

Course Description

All archaeologists work in a geological context. In conducting a survey, it is critical to understand the spatial relationships between the archaeological record and associated landforms. In excavating a site, it is essential to understand the origin and depositional mode of sediments containing the cultural record. It is also necessary for archaeologists to understand the physical post-depositional processes that modify the archaeological record. And finally, because environment affects culture in some way, sediments are relevant to archaeologists as records of paleoenvironment. This course is designed for upper division undergraduate and graduate students with variable backgrounds in archaeological, earth, or soil science who are seeking to gain those skills. The course is an overview that integrates the various subfields of geology, geomorphology, and soils geography into an archaeological context.

Learning Objectives

- Students will gain a broader understanding and appreciation of archaeology as an interdisciplinary Earth science
- Students will gain factual knowledge about geomorphic systems directly contributing to the formation of archaeological sites
- Students will apply course materials to understand complexity in the natural and behavioral dimensions of archaeological site formation
- Students will critically evaluate the contribution of archaeology to understanding of Quaternary climate reconstruction

Requirements

This course is a mixed lecture and seminar format. Attendance and participation are vital to your success, which means you must keep up with the readings. Grades for this class are based on five individual components: class participation (25%), a short

research paper (25%), and three exams (50%). Full participation in class discussions is expected, which means completing the weekly readings prior to class. Graduate students will be required to attend mandatory field trips and complete additional research (see Graduate Student Syllabus Addendum).

****FINAL EXAM— Wednesday May 3, 2017, 3:30-5:20, OLD MAIN 006**

Required Texts:

Waters, M. R. (1992). *Principles of Geoarchaeology: A North American Perspective*. University of Arizona Press, Tucson.

COURSE SCHEDULE

Week 1 January 9-13, 2017	Philosophy and History of Geoarchaeology READING: Waters (1992):1-13; Chamberlain (1890); Hassan (1979)
Week 2 January 16-20, 2017	Earth History: Geologic Time Scale and Plate Tectonics READING: Fillmore (2011); Hintze (1988) FILM: Colliding Continents ***No Class Meeting Monday January 16, 2017** ****Canvas Quiz (25 points)**
Week 3 January 23-27, 2017	Quaternary Geoscience in Archaeology READING: Holliday (2001); Haynes (1990); Antevs (1955)
Week 4 January 30-February 3, 2017	Quaternary Geochronology READING: Bradley (1999); Kennett et al. (2014); Pederson et al. (2014)
Week 5 February 6-10, 2017	Weathering, Sediment Production, and Transport READING: Waters (1992):15-40; Birkeland (1999):60-77, 94-99; Byers et al. (2015)
Week 6 February 13-17, 2017	Stratigraphy and Alluvial Processes READING: Waters (1992):60-114; Huckleberry (2001) ***Exam #1 (100 Points)**
Week 7 February 20-24, 2017	Alluvial Processes: Case Studies READING: Waters (1992):115-184; Harvey and Pederson (2011); Rittenour et al. (2015); Waters and Haynes (2001) ***No Class Monday February 20, 2017** ****Monday Schedule on Tuesday February 21, 2017**
Week 8 February 27-March 3, 2017	Eolian Processes READING: Waters (1992):185-214; Bussaca et al. (2004); Mayer and Mahan (2004)
Week 9 March 6-10, 2017	SPRING BREAK—NO CLASS

Week 10 March 13-17, 2017	Rockshelters and Caves READING: Waters (1992):240-248; Woodward and Goldberg (2001); Finley (2016); Finley et al. (2017)
Week 11 March 20-24, 2017	Great Basin Pluvial Lakes READING: Waters (1992):220-230; Reheis et al. (2014); Foit and Mehringer (2016); Oviatt et al. (2003)
Week 12 March 27-31, 2017	Late Quaternary Outburst Floods FILM: Mystery of the Megaflood READING: Baker (2009); Jarrett and Malde (1988); Janecke and Oaks (2011)
Week 13 April 3-7, 2017	Soils Geography READING: Waters (1992):40-60; Holliday (1990); Mandel and Bettis (2001) ***Exam #2 (100 Points)**
Week 14 April 10-14, 2017	Soils Geography: Case Studies READING: Reider (1990); Homburg and Sandor (2011); Huckleberry et al. (2013)
Week 15 April 17-21, 2017	Site Formation READING: Waters (1992):291-316; Stein (2001); Murray (1999)
Week 16 April 24-28, 2017	Sources of Error READING: Waters (1992):291-316; Schumm (1998)
FINAL EXAM— WEDNESDAY MAY 3, 2017, 3:30-5:20, OLD MAIN 006	

ADDITIONAL READINGS

Antevs, E. (1955). Geologic-Climate Dating in the West. *American Antiquity* 20:317-345.

Baker, V.R. (2009). The Channeled Scabland: A Retrospective. *Annual Review of Earth and Planetary Science* 37:393-411.

Birkeland, P. (1999). *Soils and Geomorphology* 3rd edition. Oxford University Press, Oxford.

Bradley, R.S. (1999). *Paleoclimatology: Reconstructing Climates of the Quaternary*. Academic Press, San Diego, California.

Bussaca, A.J., J.E. Beget, H.W. Markewich, D.R. Muhs, N. Lancaster, M.R. Sweeney (2004). Eolian Sediments. In *Developments in Quaternary Science* 1:275-309.

Byers, D.A., E. Hargiss, and J.B. Finley (2015). Flake Morphology, Fluvial Dynamics, and Debitage Transport Potential. *Geoarchaeology: An International Journal* 30:379-392.

Chamberlain, T.C. (1890). The Method of Multiple Working Hypotheses. *Science* 15:92-96. 1965 Reprint.

Fillmore (2011). *Geological Evolution of the Colorado Plateau*. University of Utah Press, Salt Lake City.

Finley, J.B. (2016). Late Holocene Geoarchaeology in the Bighorn Basin, Wyoming. In *Stones Bones, and Profiles: Papers in Honor of George C. Frison and C. Vance Haynes*, edited by Marcel Kornfeld and Bruce Huckell, pp. 259-288. University of Colorado Press, Boulder.

Finley, J.B., E.N. Robinson, and M.J. Rowe (2017). A Geoarchaeological Record of Holocene Droughts in the Bighorn Basin, Wyoming, USA. Manuscript on file, Department of Sociology, Social Work, and Anthropology, Utah State University, Logan, Utah.

Foit, F.F., Jr., and P.J. Mehringer, Jr. (2016). Holocene Tephra Stratigraphy in Four Lakes in Southeastern Oregon and Northwestern Nevada, USA. *Quaternary Research* 85:218-226.

Harvey, J.E., and J.L. Pederson (2011). Reconciling Arroyo Cycle and Paleoflood Approaches to Late Holocene Alluvial Records in Dryland Streams. *Quaternary Science Reviews* 30:855-866.

Hassan, F.A. (1979). The Geologist and Archaeology. *American Antiquity* 44:267-270.

Haynes, C.V. (1990). The Antevs-Bryan Years and the Legacy for Paleoindian Geochronology. In *Establishment of a Geologic Framework for Paleoanthropology*, edited by L.F. Laporte, pp. 55-68. Geological Society of America Special Paper 242, Boulder, Colorado.

Hintze, L.F. (1988). *Geologic History of Utah*. Brigham Young University Geology Studies Special Publication 7, Brigham Young University Press, Provo, Utah.

Holliday, V. T. (1990). Pedology in Archaeology. In *Archaeological Geology of North America*, edited by N. P. Lasca, and J. Donahue, pp. 525-540. Geological Society of America, Boulder.

Holliday, V. T. (2001). Quaternary Geoscience in Archaeology. In *Earth Sciences and Archaeology*, edited by P. Goldberg, Vance T. Holliday, and C. Reid Ferring, pp. 3-36. Kluwer Academic/Plenum, New York.

Homburg, J.A., and J.A., Sandor (2011). Anthropogenic Effects on Soil Quality of Ancient Agricultural Systems of the American Southwest. *Catena* 85:144-154.

Huckleberry, G.A. (2001). Archaeological Sediments in Dryland Alluvial Environments. In *Sediments in Archaeological Context*, edited by J.K. Stein and W.R. Farrand, pp. 67-92. University of Utah Press, Salt Lake City.

Huckleberry, G.A., J. Onken, W.M. Graves, and R. Wegener (2013). Climatic, Geomorphic, and Archaeological Implications of a Late Quaternary Alluvial Chronology for the Lower Salt River, Arizona, USA. *Geomorphology* 185:39-53.

Janecke, S.U., and R.Q. Oaks, Jr. (2011). Reinterpreted History of Latest Pleistocene Lake Bonneville: Geologic Setting of Threshold Failures, Bonneville Flood, Deltas of the Bear River, and Outlets for Two Provo Shorelines, Southeastern Idaho, USA. *Field Guides* 21:195-222.

Jarrett, R.D., and H.E. Malde (1987). Paleodischarge of the Late Pleistocene Bonneville Flood, Snake River, Idaho, Computed from New Evidence. *Geologialc Society of America Bulletin* 99:127-134.

Kennett, D.J., B.J. Culleton, J. Dexter, S.A. Mensing, and D.H. Thomas. (2014). High-Precision AMS ^{14}C for Gatecliff Shelter, Nevada. *Journal of Archaeological Science* 52:621-632.

Mandel, R. D., and E.A. Bettis III (2001). Use and Analysis of Soils by Archaeologists and Geoscientists: A North American Perspective. In *Earth Sciences and Archaeology*, edited by P. Goldberg, Vance T. Holliday, and C. Reid Ferring, pp. 173-204. Kluwer Academic/Plenum, New York.

Mayer, J.H., and S.A. Mahan (2004). Late Quaternary Stratigraphy and Geochronology of the Western Killpecker Dunes, Wyoming, USA. *Quaternary Research* 61:72-84,

Murray, T. (1999). A Return to the 'Pompeii Premise'. In *Time and Archaeology*, edited by T. Murray, pp. 8-27. Routledge, London.

Oviatt, C.G., D.B. Madsen, D.N. Schmitt (2003). Late Pleistocene and Early Holocene Rivers and Wetlands in the Bonneville Basin of Western North America. *Quaternary Research* 60:200-210.

Pederson, J.L., M.S. Chapot, S.R. Simms, R. Sohbati, T.M. Rittenour, A.S. Murray, and G. Cox (2014). Age of Barrier Canyon-Style Rock Art Constrained by Cross-Cutting Relations and Luminescence Dating Techniques. *Proceedings of the National Academy of Science* 111:12986-12991.

Reheis, M.C., K.D. Adams, C.G. Oviatt, and S.N. Bacon (2014). Pluvial Lakes in the Great Basin of the Western United States—A View from the Outcrop. *Quateranry Sceicne Reviews* 97:33-57.

Reider, R.G. (1990). Late Pleistocene and Holocene Pedogenic and Environmental Trends at Archaeological Sites in Plains and Mountains Areas of Colorado and Wyoming. In *Archaeological Geology of North America, Centennial Special Volume 4*, edited by N. P. Lasca, and J. Donahue. Unites States Geological Survey, Boulder, Colorado.

Rittenour, T.M., L.L. Coats, and D. Metcalfe (2015). Investigation of Late and Post-Fremont Alluvial Stratigraphy of Range Creek, East-Central Utah: Use of OSL when Radiocarbon Fails. *Quaternary International* 362:63-76.

Schumm, S.A. (1998). *To Interpret the Earth: Ten Ways to Be Wrong*. Cambridge University Press, Cambridge.

Stein, J.K. (2001). A Review of Site Formation Processes and Their Relevance in Geoarchaeology. In *Earth Sciences and Archaeology*, edited by P. Goldberg, V.T. Holliday, and C.R. Ferring, pp. 37-51.

Waters, M.R., and C.V. Haynes, Jr. (2001). Late Quaternary Arroyo Formation and Climate Change in the American Southwest. *Geology* 29:399-402.

Woodward, J.C., and P. Goldberg (2001). The Sedimentary Records in Mediterranean Rockshelters and Caves: Archives of Environmental Change. *Geoarchaeology: An International Journal* 16:327-354.

IN COMPLIANCE WITH THE AMERICANS WITH DISABILITIES ACT (ADA), qualified students with disabilities may be eligible for reasonable accommodations. All accommodations are coordinated through the Disability Resource Center (DRC) in Room 101 of the University Inn, 797-2444 voice, 797-0740 TTY, or toll free at 1-800-259-2966. Please contact the DRC as early in the semester as possible. Alternate format materials (Braille, large print or digital) are available with advance notice.

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