

**ANTH 3095: Applied Research in Archaeobotany
Spring 2019**

Class hours: Wed, 1:00–3:45 pm

Place: Beach 453

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Office hours: By appointment

Course Description:

Archaeobotany, the study of the use of plants by people in antiquity, examines archaeological plant remains and is an inherently interdisciplinary sub-field of archaeology that integrates botany, ecology, archaeology, and social theory to explore a wide range of topics including: 1) the nature, timing, and cause of plant domestication events around the world; 2) the social and environmental dynamics and causes of the transition from hunting-and-gathering to early agriculture; 3) the role that plant-based agriculture, viticulture, or irrigation played in the emergence and collapse of early social complexity, social hierarchies, and the development of the first cities; 4) the ways in which farmers modified plant-based agriculture to suit prevailing environmental conditions and social and economic needs; and 5) the choices that people made in the past to select and procure fuel in order to sustain everyday household activities and emerging craft specializations and industries.

This course integrates lectures on current and emerging trends in archaeobotanical research with hands-on instruction in the use of a range of lab equipment, microscopy, and digital imaging tools commonly found in many labs to address the topics listed above. These tools include: 1) botanical reference material; 2) analytical balances; 3) a muffle furnace; 4) student binocular microscopes; 5) an upright materials microscope with transmitted, incident, and polarized light; and 6) a macroscope with NIS Elements imaging software. Hands-on instruction is also provided in the use of a Jeol NeoScope JCM 6000Plus benchtop scanning electron microscope with Energy Dispersive X-Ray Spectroscopy capabilities for elemental mapping. Throughout the course, a heavy emphasis is placed on the research process as each student uses the tools learned in class to design and conduct an individualized research project.

Course objectives:

Upon successful completion of this course, students will be able to:

- i. List historical and current trends within archaeobotanical research and understand the archaeological and social relevance of this work
- ii. Critically assess published research reports for research design, choice of methods, data presentation, and thoroughness of interpretations
- iii. Correctly use a range of lab equipment including microscopy and digital imaging tools and list their capabilities
- iv. Design and execute a research project
- v. Prepare research results/data for sharing with a range of academic and non-academic audiences

Required readings:

The readings for this course have been chosen from a wide range of sources including books, manuals, and journal articles. They will allow you to engage with primary research within

archaeobotany. As part of an ongoing commitment to Open Access sources and low–no cost course materials, all of these sources are freely available. Many of the readings can be accessed as pdfs through HuskyCT. Others are available within the Archaeobotany Laboratory. It is essential that you complete the required readings and assignments prior to class since weekly discussions build heavily upon assigned materials.

Required Materials:

1. **Lab notebook.** The book must be lined and bound. Books with metric graph paper are preferred. Lab notebooks can be purchased from the UConn bookstore (although many contain graph paper in inches rather than metric measurements) or from the Anthropology main office (where they cost \$8 each).
2. All other materials will be provided in class.

Course Website:

Information regarding the course, including syllabus, course assignments, readings etc., will be posted on HuskyCT (<https://huskyct.uconn.edu/>). You are encouraged to check this frequently. You will need your NetID and password to access HuskyCT. Help with HuskyCT and other digital resources can be found at the Learning Resource Center (<https://huskyct.uconn.edu/>).

Course requirements:

1. Personal statement: This short statement describes the range of experiences that you have had with scientific or lab-based research and describes your hopes for the future.
2. Bibliography and Research Proposal: You will be required to select a research project from a list of topics provided to you in class (a brief description of the range of project is provided below). A short bibliography of relevant research will be provided with each potential project. Once your selection is made, you will be required to conduct an independent literature review and assemble a list of readings that will help you progress with your project. Through study of these readings and instruction provided in class, you will develop a short research proposal outlining your research questions or hypotheses and the methods you will use to address these questions.
3. Data presentation/Analysis: You will be required to submit a short statement outlining the data analysis/presentation tools you plan on using in order to develop and share your research conclusions and interpretations.
4. Lab book: For each practical assignment, you are required to maintain a lab diary. The diary will record all practical work that you have completed. It will also include your notes and drawings of modern botanical reference material and reflections on class discussion and lab meetings. These notes will be assessed periodically throughout the course (specific dates will be given in class). Please keep class/lecture notes separate from your lab notes.
5. Discussion of assigned readings and participation in Lab Meeting discussions: This course places heavy emphasis on discussion of assigned readings and collaborative “Lab Meeting” discussions. Please make sure to read the assigned readings before class so that you are prepared to participate in thoughtful discussions of the readings. “Lab meetings” provide an opportunity to informally share work we have done, ideas we may have, and solicit thoughts on any issues we are facing with the project.
6. Research study report and presentation: You are required to design, execute, and complete a research study. Towards the end of the semester you will produce a written research report detailing your project (roughly 12–15 pages). The report should include: 1) a brief abstract; 2) an introduction outlining the scope and importance of your research and relevance to broad social topics of interest within archaeology; 3) specific research question or hypotheses addressed by

your project; 4) a short background research section; 5) a description of the methods used; 6) results; 7) discussion/interpretation of results; 8) bibliography; 9) acknowledgments (archaeological research is rarely an individual pursuit and it is important to acknowledge those who provide information or assistance). Progress towards this report will be reviewed regularly through assignments and within group Lab Meetings. The results will be presented either in poster or PowerPoint form on the last day of class. Detailed guidelines for both the paper and poster/PowerPoint presentation will be provided in class.

Grade breakdown and deadlines:

Deadlines should be strictly adhered to. If you are experiencing any difficulties with an assignment, make sure to talk to me as early as possible. It is possible to modify deadlines with advance warning. Unexcused late work will be subject to a 5% grade penalty for each day late.

	Assignment	Date due	Contribution to final grade (%)
Week 2	Personal Statement (no more than ¾ to 1 page, double spaced) detailing research/lab experience and personal goals for future	30 Jan	5
Week 4	Select research project	13 Feb	–
Week 6	Initial supplementary bibliography for research study due (should include roughly 5–10 sources)	27 Feb	5
Week 8	Research proposal due (brief description of research focus, questions, methods, and bibliography)	13 Mar	10
Week 11	Short description of data visualization/data analysis tools you draw from in final report/presentation	10 Apr	5
Week 14	Final research presentation	1 May	10
Week 14	Final research paper	3 May	25
Ongoing	Lab book (maintain detailed notes within lab book of all practical assignments)	Ongoing (assessment dates will be given in class)	20
Ongoing	Participation in class discussion/Lab Meetings	Weekly	20

Grades will be based on a 100-point score and will be converted to letter grades as follows:

Letter grade	Total score (%)	Grade point
A	93–100	4.0
A-	90–92	3.7
B+	87–89	3.3
B	83–86	3.0
B-	80–82	2.7
C+	77–79	2.3

Letter grade	Total score (%)	Grade point
C	73–76	2.0
C-	70–72	1.7
D+	67–69	1.3
D	63–66	1.0
D-	60–62	0.7
F	0–59	0

Diverse Learning Styles/Accommodations

This course is designed to accommodate a wide range of learning styles and places heavy emphasis on individualized instruction as you each pursue your self-selected research project. Lecture outlines, slides, and visual/audio recordings of the lectures will be posted on HuskyCT. Please contact me to discuss any additional academic accommodations that you may need during the semester due to a documented learning difference. I am *always* happy to discuss your needs and provide appropriate individualized accommodations. If you have not yet contacted the Center for Students with Disabilities, please do so as soon as possible so that they can facilitate support for your accommodations. The Center is able to provide a range of assistive technologies and low-distraction rooms for examinations (Wilbur Cross Room 204, Voice: (860) 486-2020, Video Phone: (860) 553-3243, e-mail: UCIS@uconn.edu, <http://csd.uconn.edu/>).

A Note on Ethics and Academic Integrity:

All students are expected to follow the student code for academic integrity in Graduate and Undergraduate Education and Research. In brief, the Student Code (<https://community.uconn.edu/the-student-code-pdf/>) states that:

A fundamental tenet of all educational institutions is academic honesty; academic work depends upon respect for and acknowledgement of the research and ideas of others. Misrepresenting someone else's work as one's own is a serious offense in any academic setting and it will not be condoned.

Copying from a book, article, website, or another student without proper citation of the source is not acceptable. Violators will be referred to the Dean of the College for a hearing on academic misconduct. Instruction on avoiding accidental plagiarism will be provided in class.

Note on conducting independent research for your project

Archaeobotanical research draws from a wide range of disciplines including archaeology, botany, ecology, geology, and sometimes chemistry. Because of this breadth, it is often helpful to seek guidance when first conducting literature searches. Please take advantage of the resources available to you at UConn and consider scheduling a short appointment with the Anthropology Reference Librarian, Marisol Ramos (marisol.ramos@uconn.edu). Information provided by Marisol will help you well beyond this class. You will all have the chance to meet Marisol early in the course. An overview of anthropological and archaeological resources available through the UConn libraries is provided at: <https://guides.lib.uconn.edu/anthropology>. Please make sure to restrict your literature searches to academic sources or relevant government resources. Guidance on evaluating sources will be provided in class.

Potential Research Projects

You will be required to select a research topic that is relevant to archaeobotanical research today. Once you have selected a topic, you will read through the appropriate bibliography provided, conduct an independent review of the literature, and develop and execute a real research project. We do not know the answers to the following topics, so this is real, active research! You will be contributing new knowledge to the field and will not simply be replicating old experiments.

1. **Assessing the impact of charring on seed preservation.** The strength of archaeobotanical interpretations rests on the ability to identify archaeobotanical specimens correctly. Many specimens become preserved through charring and exposure to fire can cause various types of seed deformation that relate to the burning environment. A number of charring experiments have been conducted to determine the nature and extents of deformation at various

temperatures and reduced environments, but much more work remains to be done. Using a muffle furnace and imaging software students can explore how various taxa respond to charring. This information can then be used to assess the level of identification that can be expected archaeologically.

2. **Differentiating between modern comparative species.** It is possible to identify some archaeobotanical remains to the species level, but sometimes only genus or family level identifications are possible. This ability varies depending upon on how well the specimens survive the charring process, but also on how morphologically variable seeds are between species within any given genus. It is known that it is difficult to separate the seeds of *Triticum durum* and *T. aestivum*, both of which were important economic wheat species with different uses. These two species can be separated, however, using rachis fragments, a plant part that attaches to the seed. Little comparative work has been conducted on other important wheat or barley species. Through a visual and morphological examination of modern wheat and barley seeds collected from across Armenia, students will assess how well these species can be distinguished from one other.
3. **Domestication of grape.** The domestication of any species is considered a dramatic shift that reflects a changing relationship between people and the domesticated plant as well as between people themselves. This is particularly true for grape, since the production of wine is often associated with the development of early social complexity. The ability to observe domestication archaeologically is firmly tied to our ability to distinguish between the wild and domestic forms of plant parts that preserve archaeologically. Seeds or pips are the most commonly encountered grape part and, since the domestication pressure on grape was exerted on the fleshy fruit and not the seed, it can sometimes be difficult to separate the two forms. Various morphological measurements of grape seeds have been used to help distinguish between wild and domestic grape seeds, but no universally accepted method exists. The home of grape domestication is not well understood, but existing data points to the Caucasus. Very little work on Caucasian grape seeds has been conducted. Through the observation of either the gross morphology or microscopic structures on the seed coat, students can assess whether it is possible to distinguish between modern domestic and wild grape seeds specimens collected from across Armenia.
4. **The archaeology of bread.** Bread forms an important staple for many societies across the globe. New evidence suggests that even hunter-gatherers in Jordan made bread. Despite this importance, little is known about bread use in antiquity, in part because bread is difficult to identify archaeologically and can easily be confused with parenchymous/tuberous tissues or fragments of animal dung. To date, some work has been done to establish criteria for identifying bread, but much more work is needed. Through experimental work, students will make a variety of leavened and unleavened breads, char the bread using a muffle furnace to replicate the archaeological process of preservation, and then use various microscopy tools to assess criteria that may be useful for identifying bread archaeologically. The criteria developed in class will then be applied to unidentified archaeological specimens to see whether it is possible to determine whether they represent bread or other plant-based tissues.
5. **Cooking.** It is known that charring deforms uncooked seeds, but the process of cooking also causes deformation. Cooking experiments have been conducted to assess how various boiling temperatures affect the morphology of starch grains, but few studies exist using intact seeds and little discussion of cooking exists within the literature on macrobotanical remains, despite the central importance of food preparation and cooking to everyday life. Students can recreate a range of cooking scenarios to determine how visual and morphological markers of various taxa

change. The data can then be used to assess whether remains preserved via cooking can be observed archaeologically.

6. **Fuel use.** In addition to securing or growing, preparing, and cooking food, people used a range of plants as fuel. Over the past few years, scholars have begun to recognize the importance of fuel economies on par with subsistence economies. Archaeobotanists are now realizing the enormous contributions they can make to our understanding of ancient fuel economies and the factors affecting fuel selection and acquisition, and the relationship between fuel use and emerging craft economies that formed the foundation of emerging social complexity. Fuels included a range of woody and shrubby taxa as well as dung fuel. Burned dung fuel contains plants consumed by animals and can provide additional information on foddering and pasturing practices. Until recently, archaeobotanists have struggled to differentiate between plant samples that represent remnants of crop processing versus remnants of burned dung. By examining dung spherulites, students will be able to assess sample origin of a range of archaeological samples in a more informed way and deepen interpretations of existing archaeobotanical datasets.

Useful websites, references, and resources (all available for consultation in the Archaeobotany Lab):

1. Pearsall, Deborah M. (2015) *Paleoethnobotany. A Handbook of Procedures*. San Diego: Academic Press.
2. Zohary, Daniel, Maria Hopf, and Ehud Weiss (2012) *Domestication of Plants in the Old World*. Oxford: Oxford University Press.
3. Christine A. Hastorf and Virginia S. Popper, eds., (1988) *Current Paleoethnobotany. Analytical Methods and Cultural Interpretations of Archaeological Plant Remains*. Chicago: The University of Chicago Press. [available in the lab]
4. Harris, James G. and Melinda Woolf Harris (2001) *Plant Identification Terminology. An Illustrated Glossary*. Spring Lake, UT: Spring Lake Publishing.
5. Nesbitt, Mark (2006) *Identification Guide for Near Eastern Grass Seeds*. London: Institute of Archaeology, University College London.
6. Willis, J. C. (1985) *A Dictionary of the Flowering Plants Ferns*. Cambridge: Cambridge University Press. [Babidge reference, Level 1: QK11 .W53 1973]
7. USDA Plants Database: <http://plants.usda.gov/>
8. Dr Duke's Phytochemical and Ethnobotanical Databases: <https://phytochem.nal.usda.gov/phytochem/search>
9. Native American Ethnobotany Database: <http://herb.umd.umich.edu/>
10. Hedrick, U. P. (1919) *Sturtevent's Notes on Edible Plants*. Albany: J. B. Lyon Company.
11. Grieve, M. (1971) *A Modern Herbal; the Medicinal, Culinary, Cosmetic and Economic Properties, Cultivation and Folk-lore of Herbs, Grasses, Fungi, Shrubs, and Trees with all their Modern Scientific Uses*. New York: Dover Publications. [First published in 1931 by John Cape Ltd] [Babidge reference, Level 1: QK9 G7 1967a]
12. Naomi Miller's list of Archaeobotanical Reports from the Near East: <http://www.sas.upenn.edu/~nmiller0/biblio.html>
13. Archaeobotanical Database of sites in the Mediterranean and the Near East: <http://www.ademnes.de/>
14. Helmut Kroll's Archaeobotanical Database of the Near East: <http://www.archaeobotany.de/>
15. Maryland Archaeobotany: <http://www.jefpat.org/archeobotany/Home.aspx>

Class Schedule and Readings

Date	Topic and readings
1. 23 Jan	<p>Course Introduction. The History of Archaeobotany and Basic Practices</p> <p>Lab exercise: Brief introduction to equipment and resources in Archaeobotany Laboratory followed by a presentation by Anthropology Reference Librarian, Marisol Ramos.</p> <p>Handout: 1) Guidelines for Personal Statement (Due next week. No more than $\frac{3}{4}$ to 1 page, double spaced, detailing research/lab experience and personal goals for future); 2) List of descriptions of potential research projects</p> <p>Readings: Levetin, Estelle and Karen McMahon (2012) "Plant Systematics and Evolution," in <i>Plants and Society</i>. Boston: McGraw Hill, 123–138. Pearsall, Deborah M. (2015) <i>Paleoethnobotany. A Handbook of Procedures</i>. San Diego: Academic Press, Chapter 1 (pp. 27–34).</p>
2. 30 Jan	<p>Current Research Trends in Archaeobotany</p> <p>Lab exercise: Tour of the UConn George Safford Torrey Herbarium on 1st floor of Biological Sciences and Physics Building followed by brief tour of UConn Greenhouses</p> <p>Work due: Personal Statement due.</p> <p>Handout: UConn Tree Walk map (optional, for reference only. http://www.uconnarboretum.uconn.edu/content/TREE_GUIDE_CAMPUS_WALK.pdf)</p> <p>Readings: Research projects handout provided in class detailing the range of research projects available as part of the class (also available within HuskyCTI). Outram, Alan K. (2008) "Introduction to experimental archaeology," <i>World Archaeology</i> 40(1): 1–6. DOI: 10.1080/00438240801889456. Smith, Alexia, Krista Dotzel, Joyce Fountain, Lucas Proctor, Madelynn von Baeyer (2015) "Examining Fuel Use in Antiquity: Archaeobotanical and Anthracological Approaches in Southwest Asia," <i>Ethnobiology Letters</i> 6(1): 192–195. Zohary, Daniel, Maria Hopf, and Ehud Weiss (2012) <i>Domestication of Plants in the Old World</i>. Oxford: Oxford University Press, Chapter 1 (scan Chapter 2).</p>
3. 6 Feb	<p>Identifying Archaeobotanical Remains. Ethnographic Observation and Interpretive Models</p> <p>Lab exercise: Visual examination of Archaeobotany Lab Reference Collection and Flora. Wheat dissection, drawing, and labeling of plant parts. Involves use of low-powered microscopy with student binocular microscopes.</p> <p>Assignment: 1) Lab book—document dissection in lab book with drawings (drawn to scale) and annotation of plant parts; 2) Independent research on research project choices (preliminary literature searches).</p> <p>Readings: Charles, M.P. (1984) "Introductory Remarks on the Cereals," <i>Bulletin on Sumerian</i></p>

	<p><i>Agriculture</i> 1: 17–31.</p> <p>Hillman, Gordon (1984) “Interpretation of Archaeological Plant Remains: The Application of Ethnographic Models from Turkey,” in W. van Zeist and W. A. Casparie, ed., <i>Plants and Ancient Man: Studies in Palaeoethnobotany</i>. Rotterdam: Balkema, 1–41.</p> <p>Stevens, Chris J. (2014) “Intersite Variation within Archaeobotanical Charred Assemblages: A Case Study Exploring the Social Organization of Agricultural Husbandry in Iron Age and Roman Britain,” Mac Marston, Jade d’Alpoim Guedes, and Tina Warinner, eds., <i>Current Methods in Paleoethnobotany</i>. Denver: University Press of Colorado, Chapter 12.</p>
4. 13 Feb	<p>Charring Experiments</p> <p>Lab exercise: Use of balances and muffle furnace</p> <p>Work due: Make final selection of research project</p> <p>Assignment: 1) Lab book—document charring experiment conducted in class providing detailed and accurate descriptions of methods used; 2) Continue independent research for personalized bibliography (see section above for description of help that can be provided by the Anthropology Reference Librarian).</p> <p>Readings:</p> <p>Boardman, Sheila and Glynis Jones (1990) “Experiments on the Effects of Charring on Cereal Plant Components,” <i>Journal of Archaeological Science</i> 1990, 17: 1–11.</p> <p>Bradbaart, Freek and Pim F. van Bergen (2005) “Digital imaging analysis of size and shape of wheat and pea upon heating under anoxic conditions as a function of the temperature,” <i>Vegetation History and Archaeobotany</i> (2005) 14:67–75.</p>
5. 20 Feb	<p>Documenting Spherulites and Fuel Use</p> <p>Lab exercise: Use of Leica DM2700 microscope with transmitted light (brief introduction to incidental light). Preparation of slides from archaeobotanical samples and/or sediment, identifying and quantifying spherulites.</p> <p>Assignment: 1) Lab book—document preparation of spherulite slides and observation (include notes on observation of spherulite comparative material); 2) Lab book—finalize documentation of charring experiment (update charred sample descriptions).</p> <p>Readings:</p> <p>Shahack-Gross, Ruth (2011) “Herbivorous livestock dung: formation, taphonomy, methods for identification, and archaeological significance,” <i>Journal of Archaeological Science</i> 38: 205–218.</p> <p>Smith, Alexia, Lucas Proctor, Thomas Hart, and Gil Stein (2018) “The Burning Issue of Dung in Archaeobotanical Samples: A Case-Study integrating Macro-botanical, Dung Spherulites, and Phytoliths to assess Sample Origin and Fuel Use at Tell Zeidan, Syria,” <i>Vegetation History and Archaeobotany</i>. https://doi.org/10.1007/s00334-018-0692-9 (Open Access)</p>

6. 27 Feb	<p>Observing Domestication</p> <p>Lab exercise: Use of Nikon AZ100 microscope. Introduction to NIS Elemental visualization software (photographing using z-stacking and measuring specimens)</p> <p>Work due: Submit supplementary bibliography for research topic (the bibliography does not need to be annotated at this time—a simple list of readings you plan to examine is fine. Roughly 6–8 papers are expected). Feedback on list will be provided within a day of class</p> <p>Assignment: Lab Book—include notes on lab exercise.</p> <p>Readings: Willcox, George (2004) “Measuring grain size and identifying Near Eastern cereal domestication: evidence from the Euphrates Valley,” <i>Journal of Archaeological Science</i> 31 (2): 145–150. Mangafa, M. and K. Kotsakis (1996) “A New Method for the identification of Wild and Cultivated Charred Grape Seeds,” <i>Journal of Archaeological Science</i> 23:409–418. Wu, Yan and Changsui Wang (2009) “Extended depth of focus image for phytolith analysis,” <i>Journal of Archaeological Science</i> 36: 2253–2257.</p>
7. 6 Mar	<p>Differentiating between Species and Observing Plant Use</p> <p>Lab exercise: Introduction to use of JCM-6000PLUS NeoScope Benchtop SEM</p> <p>Assignment: 1) Lab Book—update notes on lab exercise; 2) continued work annotating bibliography and development of proposal (due next week). The proposal should be double-spaced to facilitate editing and should not exceed 4 pages (excluding list of resources and bibliography). It should include the following sections: 1) Relevance of Research: a short paragraph outlining the broad scope/research implications of your study (why archaeologists care about this issue); 2) Research Questions: a simple list of your specific research questions/hypotheses; 3) Methods: brief description of the methods you will use within your research study to address the questions you pose; 4) Equipment needed: list of equipment/supplies/resources you will need to complete this study; 5) Bibliography: annotated bibliography (roughly 3–5 sentences per article. 1–2 sentences summarizing main goal of article/main archaeological problem being addressed. 1–2 sentences summarizing methodological or theoretical approach. 1 sentence summarizing how paper relates to your study).</p> <p>Readings: Henry, Amanda G., Holly F. Hudson, Dolores R. Piperno (2009) “Changes in starch grain morphologies from cooking,” <i>Journal of Archaeological Science</i> 36: 915–922. Butler, Ann (1996) “Trifolieae and related seeds from archaeological contexts: problems in identification,” <i>Vegetation History and Archaeobotany</i> 5(1–2): 157–167. Bruno, Maria C. (2006) “A Morphological Approach to Documenting the Domestication of <i>Chenopodium</i> in the Andes,” in Melinda A. Zeder, Daniel G. Bradley, Eve Emshwiller, and Bruce D. Smith, eds., <i>Documenting Domestication. New Genetic and Archaeological Paradigms</i>. Berkeley: University of California Press, 32–45.</p>

8. 13 Mar	<p>Emerging Applications of Science in Archaeobotany</p> <p>Lab exercise: Introduction to EDS (Energy Dispersive X-Ray Spectroscopy) function within JCM-6000PLUS NeoScope Benchtop SEM</p> <p>Work due: Submit research proposal. Feedback will provided via email before the end of Spring Break so that you can begin your research as soon as we resume classes.</p> <p>Assignment: Lab book—documentation of lab exercises performed in class.</p> <p>Readings: González Carretero, Lara, Michèle Wollstonecroft, Dorian Q. Fuller (2017) “A methodological approach to the study of archaeological cereal meals: a case study at Çatalhöyük East (Turkey),” <i>Vegetation History and Archaeobotany</i> 26: 415–432. DOI 10.1007/s00334-017-0602-6 Carretero, Monica N. Ramsey, Dorian Q. Fuller, and Tobias Richter (2018) “Archaeobotanical evidence reveals the origins of bread 14,400 years ago in northeastern Jordan,” <i>PNAS</i> 115(31): 7925–7930. Soulтана Maria Valamoti (2013) “Towards a distinction between digested and undigested glume bases in the archaeobotanical record from Neolithic northern Greece: A preliminary experimental investigation,” <i>Environmental Archaeology</i> 18(1): 31–42. DOI: 10.1179/1461410313Z.000000000021</p>
20 Mar	<p>Spring Break</p>
9. 27 Mar	<p>Data Analysis and Data Presentation</p> <p>Lab exercise: Individual project work</p> <p>Assignment: Continued work on personal project</p> <p>Readings: Ongoing study of approved individualized bibliography. Pearsall, Deborah (2015) “Presenting and Interpreting Results,” in <i>Paleoethnobotany. A Handbook of Procedures</i>. San Deigo: Academic Press, 144–183.</p>
10. 3 Apr	<p>Data Analysis and Data Presentation II</p> <p>Lab exercise: Individual project work</p> <p>Assignment: 1) Data presentation exercise (reflect upon the past two lectures and the reading so far and provide a short description of the data analysis/data visualization tools you will use to present your work); 2) Continued work on personal project/Lab Meeting check-in.</p> <p>Readings: Ongoing study of approved individualized bibliography. Smith, Alexia (2014) “The Use of Multivariate Statistics within Archaeobotany,” in Mac Marston, Jade d'Alpoim Guedes, and Tina Warinner, eds., <i>Current Methods in Paleoethnobotany</i>. Denver: University Press of Colorado, 181–204.</p>

11. 10 Apr	<p>Forms of Data Communication</p> <p>Lab exercise: Individual project work</p> <p>Work due: Data presentation exercise due.</p> <p>Assignment: Continued work on personal project/Lab Meeting check-in.</p> <p>Readings: Ongoing study of approved individualized bibliography. Trainor, John K. (2012) “Chapter 2: Creating and Presenting an Academic Poster,” in Jason E. Miller and Oona Schmid, eds., <i>How to Get Published in Anthropology. A Guide for Students and Young Professionals</i>. Lanham, MD: AltaMira Press, 12–23. Miller Vick, Julia, and Jennifer S. Furlong (2008) “6. Conference Presentations and Networking,” in <i>The Academic Job Search Handbook</i>. Philadelphia: The University of Pennsylvania Press, 36–39. List of Anthropology Journals with Impact Factors: https://scholar.google.com/citations?view_op=top_venues&hl=en&vq=soc_anthropology</p>
12. 17 Apr	<p>Open Lab Work (no lecture this week: the entire class period will be devoted to furthering research project and Lab Meeting discussions)</p> <p>Lab exercise: Individual project work</p> <p>Assignment: Continued work on personal project/Lab Meeting check-in.</p> <p>Readings: Ongoing study of approved individualized bibliography.</p>
13. 24 Apr	<p>Open Lab Work (no lecture this week: the entire class period will be devoted to furthering research project and Lab Meeting discussions)</p> <p>Lab exercise: Individual project work</p> <p>Assignment: Continued work on personal project/Lab Meeting check-in.</p> <p>Readings: Ongoing study of approved individualized bibliography.</p>
14. 1 May	<p>Student Presentations and Research Forum</p> <p>Students will present the results of their research project either in small groups or individually. Presentations must be given in either poster or PowerPoint form and should include: 1) a description of the scope and importance of the research; 2) research question or hypothesis; 3) a short background research section 4) a brief description of the methods used; 5) results; 6) discussion/interpretation of results; 7) bibliography; 8) acknowledgments. More detailed guidelines will be given in class.</p> <p>Forum: following presentations, the class will discuss the results of each project and determine ways in which the studies could be built upon in the future. Potential avenues for disseminating data will be reviewed.</p> <p>Research paper due: 3 May 2019 (Research papers should be largely complete by 1 May 2019. The due date is extended to 3 May to provide an opportunity to incorporate minor revisions based on the question/answer forum)</p>

