Spring 2019 (Updated April 2, 2018)

ARCH 1775 Animals in Archaeology

Class Meetings: Tuesdays and Thursdays 10:30-11:50am, BioMed 015
Instructor: Dr. Katherine Brunson
Office Hours: Wednesdays 3-5pm in BioMed 015 or by appointment
Email: katherine_brunson@brown.edu
Canvas Website: https://canvas.brown.edu/courses/1077105

Course Description:

Food, foe, friend: animals play all these roles, and more, in their relationship to humans, in the past as well as the present. This course will explore how zooarchaeology—the study of animal remains (bones, teeth, and shells)—allows us to reconstruct ancient human-animal-environmental interactions. We will cover a range of topics and analytical techniques, including hands-on sessions for the identification and quantification of faunal remains. Additional topics will include ancient DNA in zooarchaeology, bone stable isotope analyses, human-caused extinctions, animal domestication, bone artifact production, and animal sacrifice.

Course Learning Goals:

- Learn hands-on skills for identifying the bones of mammals, fish, reptiles, and birds. By the end of the course you will be able to identify every bone in the mammalian skeleton and distinguish between common taxa.
- Learn methods for quantifying and comparing faunal assemblages.
- Identify human-caused and naturally-caused modifications to bones. Analyze the taphonomic factors that influence faunal assemblages.
- Practice collecting zooarchaeological data from ancient and fragmentary faunal remains.
- Analyze zooarchaeological data to draw conclusions about past environments, animal ecologies, and human behaviors.
- Learn how biomolecular techniques such as ancient DNA, stable isotope analysis, and collagen fingerprinting can be used to address zooarchaeological research questions.
- Discuss recent zooarchaeological perspectives on human-caused extinctions, animal domestication, foodways, bone artifact production, and ritual uses of animals.

Assessment:

Lab practical quizzes	50%
Research project part I	15%
Research project part II	25%
Participation	10%

Classroom Activities: In general, Tuesday classes will be reserved for lectures, discussion of weekly readings, and review. Thursday classes will be reserved for identification quizzes and hands-on lab work with skeletal materials. Each week we will learn about a new part of the skeleton (e.g., teeth, skull, limb bones, etc.) and a key concept in the field of zooarchaeology (e.g., taphonomy, domestication, bone artifact production, etc.).

Lab Practical Quizzes: There will be eight weekly lab practical quizzes that test students on anatomy and bone identification (e.g., taxon, element, side of the body, surface modifications, etc.). The lowest quiz grade can be dropped, excluding the final in-class quiz. Quizzes are cumulative.

There are two types of lab practical quizzes:

1) **ID boxes.** These are open note, untimed quizzes that should not take more than 30 minutes. Every week a box of bones will be left on the mezzanine level (top floor) of Rhode Island Hall. Students must make arrangements to visit Rhode Island Hall during open hours (8am-5pm) to identify the bones in the box on their own time. ID boxes must be completed by 9am on Thursdays.
2) **Final in-class identification quiz.** Bones will be set out at stations around the room and students will have 90 seconds to identify the bones at each station before rotating. The final quiz must be completed during the scheduled class period. No make-up quiz will be offered.

Research Project Part I: Each student will analyze a real zooarchaeological dataset provided by the instructor and will write a report summarizing their results. For the first part of the project, students will practice compiling tables and charts with key types of zooarchaeological data. After receiving feedback from the instructor, these tables can be revised to form the foundation of the second part of the research project. For part I, students should turn in a document with the following information: 1) summary tables listing NISP and MNI according to taxon; 2) bone charts listing MNE for select taxa; and 3) epiphyseal fusion data for at least one taxon. **Part I of the research project is due on March 21.**

Research Project Part II: For the second part of the research project, each student will write an approximately 3000 word report that includes, but is not limited to the following sections: 1) description of the archaeological site, excavation contexts analyzed, previous zooarchaeological research that has been published, and the dataset analyzed; 2) tables with summary data such as NISP, MNI, and MNE by taxon (revised from Part I); 3) at least two other types of analysis (e.g., analysis of kill-off patterns, butchery patterns, burning, taphonomy, size measurements, comparisons of contextual differences, etc.); and 4) the student's interpretations and conclusions. Reports must include at least 8 scholarly sources compiled from assigned readings and independent research. **Final papers are due on or before May 7.**

Participation and Classroom Conduct: Students are expected to attend all classes and come prepared to discuss the required readings. Part of the participation grade will also depend on completion of handouts and activity sheets. We will be handling real skeletal materials in class. Please treat all materials with respect. Always place padding on table surfaces to protect bones. With the exception of water, no food or drinks are allowed in the lab. Human osteology collections housed in the lab are also off-limits.

Estimated Time Allocation: Class meetings (32 hours); readings (3 hours per week, 39 hours total); studying for anatomy quizzes (5 hours per week, 65 hours total); research project part I (20 hours); research project part II (25 hours).

Accommodation for Students with Disabilities: Any student with a documented disability is welcome to contact me as early in the semester as possible to arrange accommodations. As part of this process, please be in touch with Student and Employee Accessibility Services (SEAS).

Readings and Reference Materials: All readings will be available as PDFs on the course website. Reference textbooks are also on reserve in the library. Students should complete readings before Tuesday class meetings. Copies of identification guides and other resources for bone identification will be available in the classroom and on the course website.

Open Lab Time and the RISD Nature Lab: Students are encouraged to spend time practicing skeletal identification skills on their own. Materials will be available during class time on Tuesdays and Thursdays, and on Wednesday afternoons from 3-5pm during open lab time. Skeletal collections in the RISD Nature Lab (13 Waterman Street, call 401-454-6451 for entry) are also open to the public M-Th 8am-10pm, Fri 8am-6pm, Sat 9am-6pm, and Sun 12pm-6pm.

Course Schedule:

	TUESDAYS (Lectures, Discussion, and Open Lab Time)	**THURSDAYS (Anatomy and Laboratory)**
Week 1		Jan 24: Introduction to the course. What is zooarchaeology and why should we study animal bones? Bone biology.
Week 2	Jan 29: Taxonomy. Preparing and working with comparative collections. Zooarchaeological identification and quantification methods.	Jan 31: Overview of the mammalian skeleton and directional terminology. Activity—inventory of a skeleton.
Week 3	Feb 5: Vertebrate taphonomy. Identifying surface modifications.	Feb 7: **ID BOX #1 Due** Teeth.
Week 4	Feb 12: Hunting and human-caused extinctions.	Feb 14: The skull and mandible.
Week 5	Feb 19: HOLIDAY, NO CLASS.	Feb 21: **ID BOX #2 Due** Visit to RISD Nature Lab.
Week 6	Feb 26: Intro to research project. Age at death and mortality patterns.	Feb 28: **ID BOX #3 Due** Axial skeleton.
Week 7	Mar 5: Documenting domestication.	Mar 7: **ID BOX #4 Due** Fore limb and hind limb.
Week 8	Mar 12: Biomolecular approaches.	Mar 14: Animal resources part 1.
Week 9	Mar 19: **ID Box #5 Due** Visit to Haffenreffer Museum.	Mar 21: **RESEARCH PROJECT PART I DUE.** Carpals, tarsals, metapodials, and phalanges.
	SPRING BREAK	
Week 10	Apr 2: Animal resources part 2. Guest visit by Dr. Bathsheba Demuth.	Apr 4: Activity—practice your skills on real zooarchaeological collections!
Week 11	Apr 9: Discuss the Çatalhöyük faunal record and research project progress.	Apr 11: **ID BOX #6 Due** Birds, fish, amphibians, and reptiles.
Week 12	Apr 16: Animals in ritual practice.	Apr 18: **ID BOX #7 Due** Activity—practice your skills on real zooarchaeological collections!
Week 13	Apr 23: Applied zooarchaeology and the future of the discipline.	Apr 25: **IN CLASS QUIZ (FINAL)** Course summary.
	Reading period: April 26-May 7. **FINAL RESEARCH PAPERS DUE BY MAY 7.**	

Books on reserve in the library or online:

1) Gifford-Gonzalez, D. (2018). *An Introduction to Zooarchaeology*. Cham: Springer.
2) Hillson, S. (2005). *Teeth*. Cambridge: Cambridge University Press.
3) Lyman, R. L. (2008). *Quantitative Paleozoology*. Cambridge: Cambridge University Press.
4) Reitz, E. J., & Wing, E. S. (2008). *Zooarchaeology*. Cambridge: Cambridge University Press.
5) Russell, N. (2012). *Social Zooarchaeology: Humans and Animals in Prehistory*. Cambridge: Cambridge University Press.

Weekly Assigned Readings:

Week 1: Bone Biology

Required Readings:

1) Reitz, E.J., & Wing, E.S. (2008). *Zooarchaeology*. Cambridge: Cambridge University Press. Chapter 1-3 (through page 38).
2) Selections from Kapit, W. and Elson, L.M. (2014). *The Anatomy Coloring Book*. San Francisco: Pearson Education.

Supplemental Readings:

1) Gifford-Gonzalez, D. (2018). *An Introduction to Zooarchaeology*. Cham: Springer. Chapter 3 and 4.

Week 2: Quantification Methods and Introduction to Skeletal Anatomy

Required Readings:

1) Broughton, J.M. & Miller, S.D. (2016). Zooarchaeology and Field Ecology: A Photographic Atlas. Salt Lake City: The University of Utah Press. Chapter 1.
2) O'Connor, T. (2008). *The Archaeology of Animal Bones*. College Station: Texas A&M University Press. Chapter 6 and 7.

Supplemental Readings:

1) Driver, J. et al. (2011). Identification, Classification, and Zooarchaeology. *Ethnobiology Letters* 2: 19-39. Read both the original article and the replies.
2) Lyman, R.L. (2008). *Quantitative Paleozoology*. Cambridge: Cambridge University Press. Chapter 2.
3) France, D.L. (2010). Human and Nonhuman Bone Identification: A Concise Field Guide. Boca Raton, FL: CRC Press, Taylor and Francis Group.

Week 3: Taphonomy

Required Readings:

1) Reitz, E.J., & Wing, E.S. (2008). *Zooarchaeology*. Cambridge: Cambridge University Press. Chapter 5.
2) Meadow, R.H. (1980). Animal Bones: Problems for the Archaeologist Together with Some Possible Solutions. *Paleorient* 6: 65-77.

Supplemental Readings:

1) Behrensmeyer, A.K. (1978). Taphonomic and Ecologic Information from Bone Weathering. *Paleobiology* 4: 150-162.
2) Stiner, M.C., Munro, N.D., Sanz, M., 2012. Carcass damage and digested bone from mountain lions (Felis concolor): implications for carcass persistence on landscapes as a function of prey age. *Journal of Archaeological Science* 39, 896–907.
3) Gifford-Gonzalez, D. (2018). *An Introduction to Zooarchaeology*. Cham: Springer. Part IV on taphonomy.

Week 4: Hunting and Human Caused Extinctions

Required Readings:

1) Grayson D.K. (2001). The archaeological record of human impacts on animal populations. *Journal of World Prehistory* 15: 1-68
2) Meltzer, D.J. (2015). Pleistocene Overkill and North American Mammalian Extinctions. *Annual Review of Anthropology* 44: 33-53.

Supplemental Readings:

1) Nagaoka, L. (2002). The Effects of Resource Depression on Foraging Efficiency, Diet Breadth, and Patch Use in Southern New Zealand. *Journal of Anthropological Archaeology* 21 (4): 419-442.
2) Jones, T.L., Porcasi, J.M., Erlandson, H.D., Wake, T.A., & Schwaderer, R. (2008). The Protracted Holocene Extinction of California's Flightless Sea Duck (*Chendyres lawi*) and its Implications for the Pleistocene Overkill Hypothesis. *Proceedings of the National Academy of Sciences* 105(11): 4105-4108.
3) Surovell, T.A., Pelton, S.R., Anderson-Sprecher, R., & Myers, A.D. (2016). Test of Martin's Overkill Hypothesis using Radiocarbon Dates on Extinct Megafauna. *Proceedings of the National Academy of Sciences* 113(4): 886-891.
4) Steadman, D.W., Pregill, G.K., & Burley, D.V. (2002). Rapid Prehistoric Extinction of Iguanas and Birds in Polynesia. *Proceedings of the National Academy of Sciences* 99(6): 3673-3677.
3) Broughton, J.M. (1994). Declines in Mammalian Foraging Efficiency During the Late Holocene, San Francisco Bay, California. *Journal of Anthropological Archaeology* 13(4): 371-401.

Week 5:

No required readings. Catch up on work.

Week 6: Collecting and Analyzing Zooarchaeological Data

Required Readings:
1) Grigson, C. (1978). Towards a Blueprint for Animal Bone Reports in Archaeology. In D.R. Brothwell, K.D. Thomas & J. Clutton-Brock (eds.), Research Problems in Zooarchaeology (pp. 121-128). Institute of Archaeology Occasional Publication No. 3. London: Institute of Archaeology.
2) Reitz, E.J., & Wing, E.S. (2008). *Zooarchaeology*. Cambridge: Cambridge University Press. Chapter 6 and 7.

Supplemental Readings:
1) O'Connor, T. (2008). *The Archaeology of Animal Bones*. College Station: Texas A&M University Press. Chapter 8.
2) Gifford-Gonzalez, D. (2018). *An Introduction to Zooarchaeology*. Cham: Springer. Chapter 7.

Week 7: Documenting Domestication

Required Readings:
1) Zeder, M.A. (2012). Pathways to Animal Domestication. In Paul Gepts, Thomas R. Famula, Robert L. Bettinger, Stephen B. Brush, Ardeshir B. Damanica, Patrick E. McGuire, Calvin O. Qualset (eds.), *Biodiversity in Agriculture: Domestication, Evolution, and Sustainability* (pp.227-259). Cambridge: Cambridge University Press.
2) O'Connor, T. (2010). Making Themselves at Home: The Archaeology of Commensal Vertebrates. In D. Campana (ed.), *Anthropological Approaches to Zooarchaeology: Complexity, Colonialism, and Animal Transformations* (pp. 270-274). Oxford, UK: Oxbow Books.

Supplemental Readings:
1) Zeder, Melinda A. (2012). The Domestication of Animals. *Journal of Anthropological Research* 68:161–90.
2) Larson, G. & Fuller, D. (2014). The Evolution of Animal Domestication. *Annual Review of Ecology, Evolution, and Semantics* 45: 115-136.

Week 8: Biomolecular Approaches

Required Readings:

1) Reitz, E.J., & Wing, E.S. (2008). *Zooarchaeology*. Cambridge: Cambridge University Press. Chapter 3 (sections on genetic and isotopic studies, pp. 80-87).
2) Sugiyama, N., Somerville, A.D., & Schoeninger, M.J. (2015). Stable isotopes and zooarchaeology at Teotihuacan, Mexico reveal earliest evidence of wild carnivore management in Mesoamerica. *PLoS ONE* 10(9): e0135635.
3) Brunson, K. (2018). Data in the bones: Why zooarchaeologists and archaeogeneticists need each other. *SAA Archaeological Record*.

Supplemental Readings:

1) Brown, R. and Brown, K. (2011). *Biomolecular Archaeology: An Introduction*. Chichester: Wiley-Blackwell. Chapter 6.
2) Barton, L., Newsome, S., Chen, F., Wang, H., Guilderson, T., Bettinger, R. (2009). Agricultural Origins and the Isotopic Identity of Domestication in Northern China. *Proceedings of the National Academy of Sciences* 106(14): 5523-5528.
3) Buckley, M. (2018). Zooarchaeology by Mass Spectrometry (ZooMS) Collagen Fingerprinting for the Species Identification of Archaeological Bone Fragments. In: Giovas C., LeFebvre M. (eds.) *Zooarchaeology in Practice* (pp. 227-247). Springer, Cham.
4) Hofman, C.A., Rick, T.C., Fleischer, R.C., & Maldonado, J.E. (2015). Conservation archaeogenomics: Ancient DNA and biodiversity in the Anthropocene. *Trends in Ecology & Evolution* 30(9): 540-549.

Week 9: Animal Resources Part 1

Required Readings:

1) Lander, B., Schneider, M., & Brunson, K. "A History of Pigs in China: From Curious Omnivores to Industrial Pork."
2) Lapham, H.A. (2018). Tracking the Trade in Animal Pelts in Early Historic Eastern North America. In U. Albarella (ed.), *The Oxford Handbook of Zooarchaeology* (pp. 575-591). Oxford: Oxford University Press.

Supplemental Readings:

1) David, E. (2015). Principles of the Technological Analysis and Diagnostic Criterias of the Mesolithic Techniques. Master. D´emarche Technologique, Crit`ere de Diagnose des Techniques, Application dans le Domaine du M´esolithique, IPH-MNHN Paris. <cel-00129410v3> HAL Id: cel-00129410 https://cel.archives-ouvertes.fr/cel-00129410v3.
2) Moreno-García, M. and Pimenta, C.M. (2011). Animal Dung: Rich Ethnographic Records, Poor Archaeozoological Evidence. In U. Albarella, A. Trentacoste, & International Council for Archaeozoology (eds.), *Ethnozooarchaeology: The Present and Past of Human-animal Relationships* (pp. 20-28). Oxford: Oxbow Books.

Week 10: Animal Resources Part 2

Required Readings:

1) Speller, C., van den Hurk, Y., Charpentier, A., Rodrigues, A., Gardeisen, A., Wilkens, B., ... & Hofreiter, M. (2016). Barcoding the largest animals on Earth: Ongoing challenges and molecular solutions in the taxonomic identification of ancient cetaceans. *Phil. Trans. R. Soc. B* 371(1702): 20150332.
2) Additional reading by Dr. Bathsheba Demouth, Brown Dept. of History (TBD).

Supplemental Readings:

1) Wellman, H.P., Rick, T.C., Rodrigues, A.T., & Yang, D.Y. (2016). Evaluating Ancient Whale Exploitation on the Northern Oregon Coast through Ancient DNA and Zooarchaeological Analysis. *The Journal of Island and Coastal Archaeology*: 1-21.

Week 11: The Çatalhöyük Faunal Record

Required Readings:

1) Arbuckle, B.S. (2014). Inequality and the Origins of Wool Production in Central Anatolia. In B.S. Arbuckle and S.A. McCarty (eds.), *Animals and Inequality in the Ancient World* (pp. 209-229). Boulder: University Press of Colorado.
2) Peters, J., Pollath, N., & Arbuckle, B. (2018). The Emergence of Livestock Husbandry in Early Neolithic Anatolia. In U. Albarella (ed.), *The Oxford Handbook of Zooarchaeology* (pp. 247-265). Oxford: Oxford University Press.
3) Atici, L., Kansa, S.W., Lev-Tov, J., & Kansa, E.C. (2013). Other People's Data: A Demonstration of the Imperative of Publishing Primary Data. *Journal of Archaeological Method and Theory* 20(4): 663-681.

Week 12: Animals in Ritual Practice

Required Readings:

1) Hill, E. (2011). Animals as Agents: Hunting Ritual and Relational Ontologies in Prehistoric Alaska and Chukotka. *Cambridge Archaeological Journal* 21(3):407–426.
2) López Lujan, L., Chávez Balderas, X., Zúñiga-Arellano, B., Aguirre Molina, A., & Valentín Maldonado, N. (2014). Entering the Underworld: Animal Offerings at the Foot of the Great Temple of Tenochtitlan. In B.S. Arbuckle & S.A. McCarty (eds.) *Animals and Inequality in the Ancient World* (pp. 33-61). Boulder: University Press of Colorado.

Supplemental Readings:

1) Russell, N. (2012). *Social Zooarchaeology: Humans and Animals in Prehistory*. Cambridge: Cambridge University Press. Chapter 3.
2) Emery, K. et al. (2013). Archaeological Animals of the Southern Maya Highlands: Zooarchaeology of Kaminaljuyu. In C.M. Gotz and K.F. Emery (eds.) *The Archaeology of Mesoamerican Animals* (pp. 381-416). Atlanta, Georgia: Lockwood Press.

Week 13: Current Trends in Zooarchaeology

Required Readings:

1) Steele, T. (2015). The contributions of animal bones from archaeological sites: the past and future of zooarchaeology. *Journal of Archaeological Science* 56: 168-176.
2) Hunter, R.H., Silliman, S.W., & Landon, D.B. (2014). Shellfish Collection and Community Connections in Eighteenth-Century Native New England. *American Antiquity* 79(4): 712-729.

Supplemental Readings:

1) Wolverton, S., Nagaoka, L, & Rick, T. (2011). Applied Zooarchaeology: Five Case Studies. New York: Eliot Werner Publications, Inc. Chapter 1.
2) Boivin, N.L., Zeder, M.A., Fuller, D.Q., Crowther, A., Larson, G., Erlandson, J.M., ... & Petraglia, M.D. (2016). Ecological Consequences of Human Niche Construction: Examining Long-term Anthropogenic Shaping of Global Species Distributions. *Proceedings of the National Academy of Sciences* 113(23): 6388-6396.
3) Nagaoka, L. (2012). The Overkill Hypothesis and Conservation Biology. In Wolverton, S., & Lyman, R.L. (eds.), *Conservation Biology and Applied Zooarchaeology* (pp. 110-138). Tucson: The University of Arizona Press.