

## **Ancient Technologies of the Near East**

University of Washington

**Course:** NEAR E 313, ARCHY369C

**Instructor:** Stephanie Selover

**Term:** Spring, 2019

**Office:** Denny M220E

**Room:** DEN 112

**Email:** sselover@uw.edu

**Time:** T/Th 1:30-3:20

**Office Hours:** Wednesdays, 3:30-5:20pm

---

---

### **Course Description:**

Ancient technologies remain one of the most studied features of the archaeology of ancient civilizations. While there are many types of ancient technologies, this course is an introduction to the three primary pyrotechnic (fire based) technologies: the creation of ceramics, glass and metals.

The anthropology and archaeology of these materials is a vast topic, far too large to adequately cover in a single quarter. This course instead seeks to be an introduction to the subject of ancient pyrotechnic technologies. We will cover the laboratory methods used by modern archaeological scientists to study and understand ancient ceramics, glass and metals, using both hands-on methods as well as readings on the subjects. We will also review the methodologies behind the creation of these materials, from raw materials to final object. The course will focus on the invention of these technologies in the ancient Near East, with brief comparisons with the isolated inventions in China and the New World.

Each week will consist of, for the most part, lectures on Tuesdays, and labs on Thursdays. In the second half of the quarter, some labs be split across the week, with half the class attending lecture, while the other half is in the lab, then switching. This will be discussed in class during the first week. Reminders for different lab locations and times will also be posted in advance on Canvas.

Students are responsible for all readings, one in-class presentation on a reading of the student's choice, a lab book write-up, an in-class midterm and final, and a research paper on a subject of the student's choice.

### **Course Objectives:**

- To learn about the three major pyrotechnic technologies of the ancient Near East: ceramic production, glass production and metal production
- To learn how modern archaeologists analyze various archaeological materials and what can and cannot be known about these materials
- To learn when and how the pyrotechnic technologies were first invented throughout the world
- To learn basic archaeological laboratory skills, techniques and methodologies
- To learn how to create copper from copper ore, in a lab and in a rough kiln

### **Course Format:**

Class will meet twice a week. In general, Tuesdays will be lectures and discussions, and Thursdays will be labs. Each class is expected to be a discussion rather than a straight lecture by the instructor, so students are responsible for all readings before the start of class and are expected to actively contribute.

During each discussion class, a short “one-minute” response on the topic of the day will be given at some point during class, based on readings. Please come to class prepared for discussion.

Each student will be responsible for giving one presentation during the quarter, on a reading of their choice from the *Recommended Reading* for the week. The presentation will last between 5-10 minutes, and will be a critique of the reading, rather than just a simple summary. Students are expected to ask the class discussion questions during the presentation. If you like, you may make a small handout to give to the class. A sign-up sheet for presentations will be handed out in the first week of classes.

Students will form lab groups in the first week (four groups, five people each), and will remain with those groups for the entire quarter. Thursday labs will usually be located either in the regular course classroom, outdoors, or in Mueller, as stated on the syllabus. If there is a need to change a date of a lab, I will announce it at least a week beforehand.

Each student is responsible to buy and keep their own lab notebook. For each lab, a series of questions will be given, to be answered in your notebook, along with your personal observations and sketches. The completed notebook is due at the end of the class, on June 6.

Each student is required to write a final paper, at least 5 pages in length. The topic of the paper is the student’s choice, and can be from any part of the world in any (pre-modern) time period, though it must deal with some aspect of pyrotechnic technologies. All topics must be cleared by the instructor. Topics for the paper will be due to the instructor by May 9. Students are recommended to make an appointment with the instructor to go over their topic before the due date. The final paper is due by 11:59 pm on June 10.

### **Prerequisites:**

This course is open to all students interested in the ancient Near East, archaeology, history, the history of science, anthropology or material science. No prior experience is necessary.

### **Required Readings and Classes:**

There are no textbooks for this course. Rather, the readings for this course come from a wide variety of monographs, series and journals. All readings will be found on the course Canvas website. The assigned readings are to be completed by each student before the start of the class. Staying on top of the readings will maximize a student’s learning experience and prepare them for discussions. It also allows the students to ask relevant questions during class. Readings are subject to change as determined by the instructor, with at least one week's notice.

Each class will have around 30 pages of assigned reading. All assigned readings are to be completed by each student **before** the start of each class. Staying on top of the readings will maximize a student’s learning experience and prepare them for in-class discussions. It also allows students to ask relevant questions during class. The material covered in the readings will not repeat exactly the material covered in class, so both readings and good class attendance are a must for getting the most out of the course.

Please arrive on time for class. It is rude and disrespectful to both your fellow students as well as to the instructor to arrive after the start of class, interrupting lecture or discussion. Everyone here is an adult, please be responsible for your own time management.

**Grading Policy:**

- In-Class Reading Presentation 10%
- One-Minute In-Class Essays 10%
- In-Class Midterm (May 7) 15%
- Lab Notebook (June 6) 25%
- Final Paper (Topic due by May 9; Paper due on June 10 by 11:59pm) 20%
- In-Class Final Exam (June 6) 20%

**Grade Scale:**

You can always track your grades throughout the quarter on the online grade book on Canvas. I encourage you to do so to gauge your progress in class. Please contact us as soon as possible if you suspect any errors.

Letter	Number	Percentage	Letter	Number	Percentage	Letter	Number	Percentage
A+	4.0	>95%	B-	2.8	83%	C-	1.6	71%
A	3.9	94%	B-	2.7	82%	C-	1.5	70%
A-	3.8	93%	B-	2.6	81%	D+	1.4	69%
A-	3.7	92%	B-	2.5	80%	D+	1.3	68%
A-	3.6	91%	C+	2.4	79%	D+	1.2	67%
A-	3.5	90%	C+	2.3	78%	D	1.1	66%
B+	3.4	89%	C+	2.2	77%	D	1.0	65%
B+	3.3	88%	C	2.1	76%	D	0.9	64%
B+	3.2	87%	C	2.0	75%	D-	0.8	63%
B	3.1	86%	C	1.9	74%	D-	0.7	60-62%
B	3.0	85%	C-	1.8	73%	E	0.0	<62 %
B	2.9	84%	C-	1.7	72%			

**Technology in Class:**

The use of laptops in class is allowed for note taking and for referencing class readings. Surfing the web, checking emails, checking Facebook, online shopping, etc. is prohibited. Such activity is disruptive to the individual, the instructor, and to the remainder of the class. However, I would highly encourage students to take notes in class by hand, as numerous studies have shown handwritten notes to be far more useful for students than typed notes.

If I do find a student using a laptop for any purpose other than note taking, the privilege of using the laptop in class will be revoked after one warning.

Please turn off your cellphones before coming to class; the use of cellphones is prohibited for any reason.

**Disability Resources for Students:**

If you need any type of accommodation, please contact the Office of Disability Resources for Students (<http://www.washington.edu/students/drs>). We are happy to work with Disability Resources to provide appropriate accommodation.

**Self-Care**

It is important that we take care of ourselves inside and outside of class by learning how to care for our body, mind and spirit. Toward that end, there are many different kinds of support services on campus, including the Counseling Center, Hall Health, and the IMA. If you are concerned about yourself or a friend who is struggling, Safecampus, at [1-800-685-7233](tel:1-800-685-7233), is a very helpful resources to learn more about how to access campus-based support services. Also, if you ever need someone to talk to, I always make myself available to students as best I can. Please feel free to email me or come by my office.

**Make-Up Policies:**

Make-ups for the midterm, presentations or final paper will not be permitted except in the case of emergencies or medical reasons, unless previously cleared with the instructor. Please let me know if there is a problem ahead of time: it is far easier for me to grant extensions or make-ups if I am informed before the fact.

Please be on time to class, and if for any reason you must leave early, please leave quietly and do not disrupt the other students on your way out. No talking during class, except during discussion periods. However, always feel free to ask the instructor a question at any point during class. If you have a question, chances are five other students have a similar question, please speak up.

**Academic Honesty:**

Students are expected to treat their fellow classmates and instructors with honesty and respect throughout the course. All exam answers and posters must reflect original work. No form of cheating will be tolerated. The following link has information on academic honesty, plagiarism, and consequences:

<http://www.washington.edu/uaa/gateway/advising/help/academichonesty.php>

Student are expected to adhere to the University of Washington Code of Student Conduct which can be found at the following link:

<http://apps.leg.wa.gov/WAC/default.aspx?cite=478-120>

The University of Washington is committed to fostering an environment where the free exchange of ideas is an integral part of the academic learning environment. Disruption of classroom discussions can prohibit other students from fully engaging and participating. Any student causing disruption may be asked to leave any class session, and, depending on the severity and frequency of that behavior, an incident report may be filled with Community Standards and Student Conduct. As a condition of enrollment, all students assume responsibility to observe standards of conduct that will contribute to the pursuit of academic goals and to the welfare of the academic community. For more detailed information on these standards, please visit: <http://apps.leg.wa.gov/WAC/default.aspx?cite=478-120>.

## Course Outline:

### Week 1: Introduction to Ancient Technologies

#### April 2: Introduction to the Class

*Required Readings:* None

#### April 4: Anthropology of Artifacts

*Required Readings:*

- Pfaffenberger, B. 1992 "Social Anthropology of Technology" *Annual Review of Anthropology*. 21, pages 491-516

*Recommended Readings:*

- Dobres, M.A. and Hoffmann, C. 1994 "Social Agency and the Dynamics of Prehistoric Technology" *Journal of Archaeological Method and Theory* 1(3), pages 211-258
- Ingold, T. 1997 "Eight Themes in the Anthropology of Technology" *Social Analysis*. 41(1), pages 106-139
- Miller, D. 1994, "Artifacts and the Meanings of Things" in *The Companion Encyclopedia of Anthropology*, Tim Ingold, ed., Routledge, NY, pages 396-419
- Tilley, C. 1989 "Interpreting Material Culture" In *The Meanings of Things: Material Culture and Symbolic Expression*, Hodder, Ian ed., Unwin Hyman, Boston, pages 185-194

### Week 2: Ceramics

#### April 9: History of Ceramics in the Near East

*Required Readings:*

- Sinopi, C. 1991 *Approaches to Archaeological Ceramics*, Chapter 2: "Defining Ceramics," pages 9-42

*Recommended Readings:*

- Clark, G.D. and Gosser, D. 2000 "Reinventing Mesoamerica's First Pottery." In *The Emergence of Pottery: Technology and Innovation in Ancient Societies*, W. Barnet and J. Hoopes, eds., pages 209-222
- Costin, C.L. 2000 "The Use of Ethnoarchaeology for the Archaeological Study of Ceramic Production" *Journal of Archaeological Method and Theory* 17:4, pages 377-403
- Hoopes, J. and Barnett, W., 1995 "The Shape of Early Pottery Studies" in *The Emergence of Pottery: Technology and Innovation in Ancient Societies*, W. Barnet and J. Hoopes, eds., pages 1-20

## **April 11: Ceramic Analysis**

### **Ceramics Lab**

#### *Required Readings:*

- Rice, P. 2015 “Mineralogical and Chemical Characterization of Pottery” in *Pottery Analysis: A Sourcebook*, pages 291-303

#### *Recommended Readings:*

- Childress, M.R. 1992 “Mortuary Vessels and Comparative Ceramic Analysis: An Example from the Chucalissa Site” *Southeastern Archaeology* 11:1, pages 31-50
- Culbert, T.P. and Rands, R.L. 2007 “Multiple Classifications: An Alternative Approach to the Investigation of Maya Ceramics” *Latin American Antiquity* 18:2, pages 181-190
- Druc, I. 2012 “What is Local? Looking at Ceramic Production in the Peruvian Highlands and Beyond” *Journal of Anthropological Research* 69:4, pages 485-513
- Grave, P., Kealhofer, L., March, B., Gates, M.H. 2008 “Using Neutron Activation Analysis to Identify Scales of Interaction at Kinet Höyük, Turkey, *Journal of Archaeological Science* 35, pages 1974-1992

## **Week 3: History of Glass**

## **April 16: Glass Manufacture and History**

#### *Required Readings:*

- Henderson, J., 2013 “Glass as a Material: A Technological Background in Faience, Pottery and Metal?” from *Ancient Glass: An Interdisciplinary Exploration*, Ch. 1, pages 1-21

#### *Recommended Readings:*

- Panagiotaki, M. 2008 “The Technological Development of Aegean Vitreous Materials in the Bronze Age” In *Vitreous Materials in the Late Bronze Age Aegean*, pages 34-63
- Schibille, N., Degryse, P., O’Hea, M., Izmer, A., Vanhaecke, F., McKenzie, J. 2012 “Late Roman Glass from the ‘Great Temple’ at Petra and Khirbet et-Tannur, Jordan- Technology and Provenance” *Archaeometry* 54(6), pages 997-1022
- Walton, M., Eremin, K., Shortland, A., Degryse, P. Kirk, S., 2012 “Analysis of Late Bronze Age Glass Axes from Nippur- A New Cobalt Colourant” *Archaeometry* 54(5), pages 835-852

## **April 18: Non-Destructive Analysis**

### **pXRF Lab**

#### *Required Readings*

- Shackley, M.R. 2011 “An Introduction to X-Ray Fluorescence (XRF) Analysis in Archaeology” in *X-Ray Fluorescence Spectrometry (XRF) in Geoarchaeology*, pages 6-44

*Recommended Readings:*

- Goren, Y., Mommse, H., Klinger, J. 2011, “Non-destructive Provenance Study of Cuneiform Tablets Using Portable X-Ray Fluorescence (pXRF)” *Journal of Archaeological Science* 38, pages 684-696
- Speakman, R., Little, N.C., Creel, D., Miller, M.R., Iñáñez, J.G., 2011 “Sourcing Ceramics with Portable XRF Spectrometers? A Comparison with INAA Using Mimbres Pottery from the American Southwest” *Journal of Archaeological Science* 38, pages 3483-3496
- Zhu, T., Huang, H., Wang, H., Hu, L., Yi, X., 2011 “Comparison of Celadon from the Yaozhou and Xicun Kilns in the Northern Song Dynasty of China by X-ray Fluorescence and Microscopy” *Journal of Archaeological Science* 38, pages 3134-3140
- Zimmerann, T., Özen, L., Kalaycı, Y., Akdoğan, R. 2010, “The Metal Tablet from Boğazköy-Hattuša: First Archaeometric Impressions” *Journal of Near Eastern Studies*, Vol. 69:2, pages 225-229

## **Week 4: Glass Analysis**

### **April 23: Analysis and Archaeology of Glass**

*Required Readings:*

- Henderson, J., 2013 “The Provenance of Ancient Glass” from *Ancient Glass: An Interdisciplinary Exploration*, Ch. 11, pages 306-344

*Recommended Readings:*

- Anastasiades, A. and Ellis, L., 2008 “The Conservation of Glass Ingots from the Bronze Age Uluburun Shipwreck” *Studies in Conservation* 53, pages 225-237
- Degryse, P., Boyce, A., Erb-Satullo, N., Eremin, K., et.al., 2010 “Isotopic Discriminants Between Late Bronze Age Glasses from Egypt and the Near East” *Archaeometry* 52(3), pages 380-388
- Li, Q.H., Liu, S., Zhao, H.X., Gan, F.X., Zhang, P. 2014 “Characterization of Some Ancient Glass Beads from the Kizil Reservoir and Qanquan Cemeteries in Xinjiang, China” *Archaeometry* 56(4), pages 601-624
- Taktrakaran, K., Karo, N., Nakai, I., 2012 “The Application of a Portable X-Ray Fluorescence Spectrometer to the On-Site Analysis of Glass Vessel Fragments from Southern Thailand” *Archaeometry* 54(3), pages 508-527

### **April 25: Mines and Ores**

#### **Beneficiation Lab**

*Required Readings:*

- Roberts, B.W. and Thornton, C.P 2015, *Archaeometallurgy in Global Perspective*, Ch. 2 “From Ores to Metals” pages 11-29 *only*
- White, P.J. 2016 “The Archaeology of Underground Mining Landscapes” *Historical Archaeology* 50(1), pages 154-168

*Recommended Readings:*

- Bassiakos, Y., and Catapotis, M., 2006 “Reconstruction of the Copper Smelting Process Based on the Analysis of Ore and Slag Samples, *Hesperia Supplements* 36, pages 329-353
- Miller, D. and Sandelowsky, B. 1999 “Smelting without Ceramics: The Drieriver Copper Smelting Site Near Rehoboth, Namibia” *The South African Archaeological Bulletin* 54:169, pages 28.37
- Weisgerber, G. 2006 “The Mineral Wealth of Ancient Arabia and Its Use: Copper Mining and Smelting at Feinan and Timna, Comparison and Evaluation of Techniques, production and Strategies”, *Arabian Archaeology of Epigraphy* 17, pages 1-30
- Yekutieli, Y. and Shalev, S. 2005 “‘En Yahav: A Copper Smelting Site in the ‘Arava” *Bulletin of the American Schools of Oriental Research* 340, pages 1-21

## **Week 5: From Ore to Metal**

### **April 30: Working, Smelting and Alloys**

#### **Groups 1 and 2 Meet at Mueller for Smelting Lab**

*Required Readings:*

- Tylecote, R. F., 1980 “Furnaces, Crucibles, and Slags” In *The Coming of the Age of Iron* Wertime, Theodore A. and James D. Muhle, eds., Yale University Press, New Haven CT., pages 183-228

*Recommended Readings:*

- Hein, A. Kilikoglou, V. and Vasiliki Kassianidou, V., 2007 “Chemical and Mineralogical Examination of Metallurgical Ceramics from a Late Bronze Age Copper Smelting Site in Cyprus” *Journal of Archaeological Science* 34, pages 141-154
- Lechtmann, H. 1999 “The Production of Copper-Arsenic Alloys (Arsenic Bronze) by Cosmelting: Modern Experiment, Ancient Practice” *Journal of Archaeological Science* 26, pages 497-526
- Caneva, C. and Giardino, C., 1996 “Extractive Techniques and Alloying in Prehistoric Central Anatolia: Experimental Methods in Archaeometallurgy” *Archaeometry 94: The Proceedings of the 29<sup>th</sup> International Symposium on Archaeometry* S. Demirci, A.M. Ozer, and G.D. Summers, eds., Ankara, pages 451-459
- Golden, J. 2009 “New Light on the Development of Chalcolithic Metal Technology in the Southern Levant” *Journal of World Prehistory* 22, pages 283-300
- Wadsworth, J. 2014 “Archaeometallurgy Related to Swords” *Materials Characterization* 99, pages 1-7



## **May 2: Creating Metals in a Modern Context**

**Smelting with Modern Technology Lab: Groups 3 and 4 Meet at Mueller  
Groups 1 and 2 Meet in Denny 112 for Lecture**

*Required Reading:*

- Roberts, B.W. and Thornton, C.P 2015, *Archaeometallurgy in Global Perspective*, Ch. 2 “From Ores to Metals” pages 29-46 *only*

## **Week 6: Microscope Lab**

### **May 7: In-Class Midterm**

### **May 9: Metallurgy and Microstructures**

**Polarizing Microscope Lab: Denny 407; Meet at Assigned Lab Group Time  
Paper Topics Due by Start of Class**

*Required Readings:*

- Scott, D. A. 1991 *Metallography and Microstructure of Ancient and Historic Metals* The Getty Conservation Institute, especially Ch. 1 “The Nature of Metals, pages 1-4, Ch. 2 “The Microstructure of Ancient Metals” pages 5-10, Ch. 3 “Two-Phased Materials” pages 11-24, Ch. 4, “The Microstructure of Tin Bronzes” pages 25-30, Ch. 9 “Corroded Microstructures” pages 43-48

*Recommended Readings:*

- Pernicka, E. 1999 “Trace Element Fingerprinting of Ancient Copper: A Guide to Technology or Provenance?” In *Metals in Antiquity*, Suzanne M. M. Young, A. Marak Pollard, Paul Budd, Robert A. Ixer, eds., BAR International Series 792, pages 163-171
- Masson-Berghoff, A., E. Pernicka, D. Hook, A Meek 2018 “(Re)sources: Origins of Metals in Late Period Egypt” *Journal of Archaeological Science* 21, pages 318-339
- Young, M.L. et. al., 2006 “Synchrotron X-Ray Diffraction and Imaging of Ancient Chinese Bronzes” *Applied Physics* 83, pages 163-168

## **Week 7: Working Metals to the Final Form**

### **May 14: Alloying and Working of Metals**

*Required Reading:*

- Rapp, G. 1988 “On the Origins of Copper and Bronze Alloying” In *The Beginning of the Use of Metals and Alloys*, Robert Maddin, ed. MIT, pages 21-27

### **May 16: Creating Metals in an Ancient Kiln**

**Ancient Kiln Technology Lab: Meet at the Lawn Behind CMA Building**

*Required Reading:*

- Roberts, B.W. and Thornton, C.P 2015, *Archaeometallurgy in Global Perspective*, Ch. 8 “Experimental Archaeology” pages 161-192

## **Week 8: Iron Working**

**May 21: The Creation and Working of Iron: Guest Lecture by Jiun-Yu Liu,  
Department of Anthropology  
Groups 1 and 2 Meet at Mueller for XRF Lab  
Groups 3 and 4 Meet in Denny 112 For Lecture**

### *Required Readings:*

- Waldbaum, J. C., 1980 “The First Archaeological Appearance of Iron and the Transition to the Iron Age” In *The Coming of the Age of Iron*, Wertime, T.A. and J.D. Muhly, eds., New Haven, pages 69-98
- Pryce, T.O. 2014 “Metallurgy in Southeast Asia” *Encyclopaedia of the History, Science, Technology, and Medicine in Non-Western Cultures*

### *Recommended Readings:*

- Jambon, A. 2017 “Bronze Age Iron: Meteoritic or Not? A Chemical Strategy” *Journal of Archaeological Science* 88, pages 47-53
- Larick, R. 1986 “Iron Smelting and Interethnic Conflict among Precolonial Maa-Speaking Pastoralists of North-Central Kenya” *The African Archaeological Review*, vol. 4, pages 165-176
- Muhly, J.D. and V. Kassianidou 2012 “Parallels and Diversities in the Production, Trade and Use of Copper and Iron in Crete and Cyprus from the Bronze Age to the Iron Age” *British School at Athens Studies*, vol. 20, pages 119-140
- Zaccagnini, C. 1990 “The Transition from Bronze to Iron in the Near East and the Levant” *Journal of the American Oriental Society* 110, pages 493-502

**May 23: Destructive Analysis of Materials: Part I  
XRF Lab: Smelting with Modern Technology Lab: Groups 3 and 4 Meet at  
Mueller  
Groups 3 and 4 Meet at Mueller for XRF Lab  
Groups 1 and 2 Meet in Denny 112 For Lecture**

### *Required Reading:*

- Review: Shackley, M.R. 2011 “An Introduction to X-Ray Fluorescence (XRF) Analysis in Archaeology” in *X-Ray Fluorescence Spectrometry (XRF) in Geoarchaeology*, pages 6-44

## **Week 9: Metallurgy in China**

**May 28: Metals and Metallurgy in Ancient China  
Groups 1 and 2 Meet at Mueller for SEM Lab  
Groups 3 and 4 Meet in Denny 112 for Lecture**

### *Required Readings:*

- Zhongpei, Z. 2000 “The Discovery of and Research on Early Copper Objects in China,” in *The Beginnings of Metallurgy in China*, Kathryn M. Lunduff, Han Rubin, Sun Shuyun, eds. Chinese Studies, Vol. 11, The Edwin Mellen Press, Lewiston, NY, pages 117-128
- Juemin, H. 2000, “On the Origin of Metallurgy in China,” in *The Beginnings of Metallurgy in China*, Kathryn M. Lunduff, Han Rubin, Sun Shuyun, eds. Chinese Studies, Vol. 11, The Edwin Mellen Press, Lewiston, NY, pages 51-61

*Recommended Readings:*

- Higham, C., Higham, T., Ciarla, R., Douka, K., Kijngam, A., Rispoli, F. 2011 “The Origins of the Bronze Age of Southeast Asia” *Journal of World Prehistory* 24, pages 227-274
- Linduff, K. 2009 “Metallurgy in Ancient Eastern Asia: Retrospect and Prospects” *Journal of World Prehistory* 22, pages 265-281
- Nickel, L. 2006 “Imperfect Symmetry: Re-thinking Bronze Casting Technology in Ancient China” *Artibus Asiae* 66:1, pages 5-39
- Rostoker, W., B. Bronson, J. Dvorak, and G. Shen 1983 “Casting Farm Implements, Comparable Tools and Hardware in Ancient China” *World Archaeology* Vol. 15, No. 2, Oct., pages 196-210

**May 30: Destructive Analysis of Materials: Part II, SEM Lab**

**Groups 3 and 4 Meet at Mueller for SEM Lab**

**Groups 1 and 2 Meet in Denny 112 for Lecture**

*Required Reading:*

- Lee, R.E. 2001 “The Scanning Electron Microscope.” In *Scanning Electron Microscopy and X-Ray Microanalysis*, pages 1-15

**Week 10: Andean Metallurgy and Conclusions**

**June 4: Andean Metallurgy**

**Lab Notebooks Due**

*Required Reading:*

- Roberts, B.W. and Thornton, C.P 2015, *Archaeometallurgy in Global Perspective*, Ch. 15 “Andean Metallurgy in Prehistory” pages 361-397 *only*

*Recommended Readings:*

- Hosler, D., 1995 “Sound, Color and Meaning in the Metallurgy of Ancient West Mexico” *World Archaeology* 27:1, pages 100-115
- Hosler, D. and Stresser-Pean, G. 1992 “The Huastec Region: A Second Locus for the Production of Bronze Alloys in Ancient Mesoamerica” *Science* 257:5074, pages 1215-1220
- Lechtman, H. 1996 “Arsenic Bronze: Dirty Copper or Chosen Alloy? A View from the Americas” *Journal of Field Archaeology* 23:4, pages 477-514
- Moore, J.D. 2006 “Copper Metallurgy in a Prehistoric Household, Casma Valley, Peru” *Nawpa Pacha: Journal of Andean Archaeology* 28, pages 141-149

**June 6: In-Class Final**

**Final Paper:** Due Monday, June 10 by 11:59pm