Archaeological Science 3098

Instructor: Dr. Gideon Hartman

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Office Hours: Thursday 1:00 – 2:00pm, or by appointment

Meets: BH 304 (alternative meeting locations will be announced in class)

Meeting time: Tuesday and Thursday, 9:30am – 10:45am

Course abstract:

Archaeological interpretation begins with the examination of unearthed remains. In many cases these remains contain valuable information that can only be unraveled using scientific methods. Archaeological Science is a course that is designed to introduce students to a wide array of methods that are used to extend the boundaries of archaeological interpretations. Dating techniques, material sciences, stable isotope techniques, and ancient DNA analysis are among the many topics that will be covered in this course. The course will also include demonstrations of scientific methods in laboratory settings (see image below). The course will be pitched at a level suitable for non-science majors.

Course requirements:

Students are expected to attend the lectures and the presentations. Reading materials will be posted at the end of each lecture. Readings are not mandatory. A Quiz that covers the material taught in class will be given at the end of each module. The quizzes will take place at the first 10 minutes of class before a new module is introduced. There will be no makeup quizzes. For grading purposes the best 3 out of 4 quizzes will averaged.

Absence from exams should be fully supported before alternative date for makeup exam is scheduled.

Course evaluation:

Module quizzes (3 out of 4) 20%

Midterm exam	35%
Final exam	35%
Attendance	10%



Course schedule:

August 28 Introduction

Module I: Dating

August 30 Absolute dating techniques + radiocarbon

September 4 Radiometric dating: Uranium series, $^{40}Ar/^{39}Ar$

September 6 Trapped charge dating and amino-acid racemization.

September 11 Dating Quiz

Module II: Imaging

September 11 Optical Microscopy

September 13 Sample preparation and optical microscopy demonstration

September 18 Scanning Electron microscopy

September 20 Visit to the Material Sciences SEM facility

September 25 Imaging Quiz

Module III: Biomolecular techniques

September 25 Ancient DNA

September 27 visit to a forensic DNA laboratory

October 2 Stable isotopes (IRMS)

October 4 Residue analysis

October 9 MIDTERM EXAM

Module IV: Tracing methods

October 11 XRF, EDS-SEM, NAA

October 16 ICP-MS

October 18 FTIR, XRD

October 23 visit to the CESE ICP-MS + XRF

October 25 Tracing Methods Quiz

Module V: Shape analysis

October 25 from caliper to Micro-scribe

October 30 radiography and CT scanning

November 1 3D scanning

November 6 Shape analysis Quiz

Module VI: Integrating Methods

November 8 Early evidence for the use of fire

November 13 Reconstructing the Neanderthal diet

November 15 Domestication: Zooarchaeology and genetics

November 20 THANKSGIVING RECESSION

November 22 THANKSGIVING RECESSION

November 27 Domestication: plants

November 29 Authenticity of artifacts: Turin Shrouds

December 4 The mystery of Ötzi the iceman

December 6 Last Class (review session)

Bibliography for the enthusiastic Students:

Bowman, S. 1990 Interpreting the past, radiocarbon dating. University of California/British Museum, Berkeley. (library calling number: CC78 .B68 1990)

Brothwell, D. R., Pollard, A. M., 2001. Handbook of Archaeological Sciences. John Wiley & Sons Ltd., Chichester.

Malainey, M. E., 2010. A consumer's guide to archaeological science: Analytical techniques**.** Springer, New-York.

Weiner, S., 2010. Microarchaeology, beyond the visible archaeological record. Cambridge University Press, Cambridge. (library calling number: CC75.7; .W45 2010)