ANT4930/ANG6930:
Digital Methods in Archaeology
Spring 2022

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T 5:10p - 6:00p
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Dauer 0342

Course Description:

Digital tools have become as fundamental to archaeology as the trowel, and are today integral to archaeological practice and knowledge production. Many questions still surround the digital turn in archaeology, however. How do we go about the process of collecting, manipulating, and displaying digital data? How do we test our own ideas, and make arguments to others, with digital methods and data? How can we use digital methods to do more than simply produce impressive visualizations? Are there, in fact, *intellectual* rewards for using digital methods in archaeology, or are the benefits primarily to efficiency?

This course focuses on *acquiring* and *using* digital data in archaeology. Such a focus suggests three underlying questions:

- What are digital data?
- Where do digital data come from?
- What are digital data used for?

These questions have both practical and theoretical implications, each of which will be explored through hands-on experience and published case studies.

In addition, at a more meta- level, this course also examines the question of whether digital data and methods are fundamentally changing the practice and potential of archaeology. To engage with these questions, this course focuses on digital methods of archaeological documentation and exploration, pairing hands-on practice with critical discussion of published case studies.

Course Goals:

A course that explores developing methods aims at a moving target. None of us can stay entirely up-to-date on new software and methods, easier and/or more efficient techniques, and creative uses for new technologies. With that in mind, this course can't – and won't – try to cover everything, but does aim to provide broad familiarity with the kinds of digital methods used to address common challenges in archaeological research.

In this course, students will:

- gain hands-on experience with a variety of digital tools for archaeological fieldwork
- develop critical perspective on the potentials and limitations of digital tools in archaeology
- establish a foundation for incorporating diverse digital methods into their own research.

Course structure:

We will consider several genres of data acquisition, manipulation, and analysis, looking at how to use the technologies involved and how to understand the formats in which they output data, as well as touching on how to manipulate and analyze those data. We will devote roughly two weeks to each topic, including elements of methodological practice and review of published applications.

Class time will be divided into seminar and lab components. Lab exercises will focus on hands-on experience with digital tools and related software, while seminars will both reflect on those experiences and discuss published case studies in their use.

Participation:

All students must participate in weekly discussions (**10%** of final grade). Discussion participation includes attendance, active listening, and constructive contributions to discussion.

Participation also includes engagement in producing collaborative documentation of the tools used in this course. That will take the form primarily of the creation of 'readme' files during use of both hardware and software—simple .txt files to be submitted on Canvas in order to produce a compilation of 'readme' files for common use. You needn't make these all the time (not for obvious steps described in exercises, for instance), but any time you confront and solve a problem it's a good idea to document, so you won't have to replicate the process from scratch later).

Lab Exercises:

This course includes **five** lab exercises (**40%** of final grade) involving various methods and data (digitization, spatial documentation, geospatial documentation, photogrammetry, and working with remote-sensing data). These exercises involve generation and use of digital data, and ask you to both develop some skills and reflect upon both the process and the results. They will be assigned in class during a Thursday session, which will be devoted to collaboratively working on them, and due the following Tuesday, when they will form the basis for a student-led discussion.

Seminar Facilitation:

Students will share responsibility for leading discussions in the seminar component of the course, on both case studies and lab exercises. Discussions will focus on both practical implementation and broader implications of methods. That is, both a) what is it like to try to *use* a given method, particularly in a field setting? and b) what is interesting about a particular method, what potential [realized or not] does it have, what pitfalls are there, what does it enable us to do better that we were doing anyway, what does it enable us to do/see that is new?

Course Project:

Student projects that provide a chance to apply new skills are an integral element of this course. Projects should be relevant to your specific research interests, so that the work done in class can potentially contribute to honors theses, dissertations, and the like. The data employed in the project may be your own, if you have a project in which you are engaged or may be harvested from published data that grabs your interest. Primary data collection (around campus) is also an option, and I can also provide data from one of my projects if anyone would like to work with that. Projects should be problem-oriented and are expected to show comprehension and creative use of the tools learned in the course.

A project proposal will be due **25 February**. This proposal should consider: 1) what problem-oriented analytical question you wish to address, 2) where, and how, you will collect data relevant to that question, and 3) which digital methodologies you plan to use to address your research question, and 4) why those methods are appropriate.

A one-page preview of the data, and methods of your project, justifying their appropriateness for your question(s), will be due **17 March**.

Projects will be presented in class on **19 April**, and completed projects (format may vary) will be due **27 April**.

Data:

Students are encouraged to use data related to their own research for their final project. If your research has not (yet) produced appropriate data, then you should start looking for data for your project *early* in the semester (this might involve published or unpublished data; consult with the instructor if you don't know where/how to look).

Readings:

Reading for this course include

1) introductory texts that cover basic concepts and provide practical instruction, and
2) case studies in the relevant applications of digital methods and use of digital data, drawn from the archaeological literature.

Required Text:

- Evans and Daly 2006 *Digital Archaeology: Bridging Method and Theory*
  - You may use a print or digital version of this text (available in the University Bookstore and elsewhere), but it must be the 2nd edition and reading assignments will reference page numbers from the print edition.

Supplementary Readings:

Because there is no single satisfying and up-to-date text that addresses the methods and issues covered by this course,

- Additional readings, when noted in the syllabus, will be available on Canvas or at the URL listed.
- Data for problem sets will be provided on Canvas or generated in class.

Required Software:

Engaging with digital methods and data requires software tools. The tools we will use are not the only ones, but have been selected with 1) a commitment to free and open-source (FOSS) software when possible, and 2) a focus on anticipating a broad selection of the kinds of tasks/needs/desires that archaeologists face in the field. They will be introduced as applicable throughout the semester, and include:

- IrfanView / XNView
- ImageJ / Fiji
- Gimp
- Inkscape
- Google Earth Engine [register for access]
- Agisoft Metashape [trial version]
- QGIS
- QField

Course Policies:

- Late/Missed Assignments:
  - Late lab exercises will not be accepted unless you have missed class (with an excused absence) that week.
  - Grades on components of your final project will be reduced by 10% for each day late. Extensions may be granted in case of particular need, but *must* be requested and approved in advance.
- Digital Devices:
  - You will be using a laptop regularly in this course. You are expected to resist the temptation to use it for anything other than course purposes during class-time.

Office hours:

You are welcome in my office hours either individually or in groups, and may use that time either to ask specific questions or simply to work with the benefit of someone available to help you through roadblocks. You are in no way required to come, but please note that this should be considered part of the education available to you, not a last resort.

Grading:

Grades in this course will be based on:

- Participation (10%)
- Exercises (40%)
- Facilitation (10%) [for undergraduates another 5% is allocated to exercises and 5% to final project]
- Final Project (40%): Proposal (5%), Preview (5%), Presentation (10%), and Project (20%)

Grading scale:

93-100%	A	80-83%	B-	67-70%	D+
90-93%	A-	77-80%	C+	63-67%	D
87-90%	B+	73-77%	C	60-63%	D-
83-87%	B	70-73%	C-	< 60%	E

Course Schedule:

→ **Readings should be completed *in preparation for* the class with which they are listed.**
→ **Lab exercises are assigned on the day they are listed, and should be completed *in preparation for* class the following Tuesday.**

Week	Dates	Topic(s)	Assignment
1	6 Jan	Introduction: WTF is Digital Archaeology	Written reflection (1 page max): What digital tools have you used in the past, and what for? What digital tools do you anticipate using going forward? Were they for acquiring data, or processing/analyzing data? If only the latter, where did the data come from?
2	11/13 Jan	Big Questions: Why digital?	Reading (11 Jan): • Introduction and Ch. 1 (Zubrow) in Evans & Daly 2006 • Perry & Taylor 2018 • Costopoulos 2016 • Wattrall 2016 Reading (13 Jan): • Roosevelt *et al.* 2015 • *The Open Digital Archaeology Textbook* *https://o-date.github.io/* [read 1 and 1.1; introductions to each section; then browse] • Kersel 2016
3	18/20 Jan	Starting with the simple and ubiquitous: Digital Images	Reading (18 Jan): • Eiteljorg II 2000 Software (20 Jan): Install and explore: • XNView [cross-platform] *or* IrfanView [Windows only] – image viewing/management • ImageJ *or* Fiji – image analysis • Gimp – raster image editing • Inkscape – vector image editing

4	25/27 Jan	From analog to digital: Digitizing and Georeferencing	Reading (25 Jan): • Wheatley & Gillings 2002: extracts from Ch.1-2 • Conolly & Lake 2006: Ch2; 77-89 Software (27 Jan): Install (but explore at your peril!): QGIS (3.16 is the current long-term stable release) Lab Exercise I: Digitizing
5	1/3 Feb	Digitizing and Georeferencing	Reading (1 Feb): Presentation and Discussion of Exercise I results Reading (3 Feb): • Gillespie & Volk 2014 • Carr *et al.* 2015
6	8/10 Feb	From real world to digital: Spatial documentation in 2-3 dimensions	Reading (8 Feb): • Howard 2006: Ch.1-3 • Bowden 2013: Ch.4 Reading (10 Feb): • Rick 2018 • Rick 1996 Lab Exercise II: Total station
7	15/17 Feb	Spatial documentation in 2-3 dimensions	Reading (15 Feb): Presentation and Discussion of Exercise II results Reading (17 Feb): • McCoy & Ladefoged 2009 • Kembel 2008 [particularly pp35-53]

8	22/24 Feb	Real world, real space: Geospatial documentation	Reading (22 Feb): • Groves 2013 [available from UF library] • QField documentation Reading (24 Feb): Cobb *et al.* 2019 Software (24 Feb): Install and explore (optional – fully functional only on Android): QField Lab Exercise III: GPS / RTK GNSS ***Project Proposal Due (25 Feb)***
9	1/3 Mar	Geospatial documentation	Reading (1 Mar): Presentation and Discussion of Exercise III results Reading (3 Mar): • Ch. 2 (Bradley) in Evans & Daly 2006 • Hill *et al.* 2019
10	8/10 Mar		***Spring Break***
11	15/17 Mar	Denser 3D: Photogrammetry and scanning	Reading (15 Mar): • Magnani *et al.* 2020 • Sapirstein & Murray 2017 Reading (17 Mar): • iWitness manual Software (17 Mar): Install and explore: • Agisoft Metashape (free 30-day trial) Lab Exercise IV: Photogrammetry ***Project Preview of Data and Methods Due (17 Mar)***

12	22/24 Mar	Photogrammetry and scanning	Reading (22 Mar): Presentation and Discussion of Exercise IV results Reading (24 Mar): • Duwe *et al.* 2016 • Hermon 2008 • Forte 2014
13	29/31 Mar	Changing Scales: Remote Sensing & Big Data	Reading (29 Mar): • Opitz & Herrmann 2018 • Parcak 2009: Ch. 1-2 ***31 Mar - No Class (SAAs)***
14	5/7 Apr	Remote Sensing & Big Data	Reading (5 Apr): • Alcover Firpi 2016 Lab Exercise V: Google Earth Engine Reading (7 Apr): Presentation and Discussion of Exercise III results • Ch. 3 (Backhouse) in Evans & Daly 2006 • Huggett 2020 • VanValkenburgh & Dufton 2020
15	12/14 Apr	Digital Tools: Transformative or trivial?	Reading (12 Apr): • Howland *et al.* 2020 • Rassalle 2021 • Earley-Spadoni 2017 • Ch. 11 (Lock) in Evans & Daly 2006 Reading (14 Apr): • Kintigh 2006 • Schmidt & Marwick 2020 • Kansa 2015 • Morgan & Eve 2012 • Evans & Daly 2006 Afterword
16	19 Apr		Project Presentations
	27 Apr	***Final Projects Due***	

List of Supplementary Readings (available on Canvas):

ALCOVER FIRPI, O. 2016. Satellite Data for All? Review of Google Earth Engine for Archaeological Remote Sensing. *Internet Archaeology* 42. https://intarch.ac.uk/journal/issue42/10/firpi.html.

BOWDEN, M. 2013. *Unravelling the landscape: an inquisitive approach to archaeology*. History Press.

CARR, C., E. WEAVER, N.P. DUNNING & V.L. SCARBOROUGH. 2015. Bringing the university of pennsylvania maps of tikal into the era of electronic GIS, in D.L. Lentz, N.P. Dunning & V.L. Scarborough (ed.) *Tikal*: 59–86. Cambridge: Cambridge University Press.

COBB, P.J., T. EARLEY-SPADONI & P. DAMES. 2019. Centimeter-level recording for all: Field experimentation with new, affordable geolocation technology. *Advances in Archaeological Practice* 7: 353–65.

CONOLLY, J. & M. LAKE. 2006. *Geographical Information Systems in Archaeology*. Cambridge: Cambridge University Press.

COSTOPOULOS, A. 2016. Digital archeology is here (and has been for a while). *Frontiers in Digital Humanities* 3: 1–3.

DUWE, S., B.S. EISELT, J.A. DARLING, M.D. WILLIS & C. WALKER. 2016. The pueblo decomposition model: A method for quantifying architectural rubble to estimate population size. *Journal of Archaeological Science* 65: 20–31.

EARLEY-SPADONI, T. 2017. Spatial History, deep mapping and digital storytelling: archaeology's future imagined through an engagement with the Digital Humanities. *Journal of Archaeological Science* 84: 95–102.

EITELJORG II, H. 2000. The Compelling Computer Image - a double-edged sword. *Internet Archaeology* 8. https://intarch.ac.uk/journal/issue8/eiteljorg_toc.html.

FORTE, M. 2014. 3D archaeology: new perspectives and challenges—the example of Çatalhöyük. *Journal of Eastern Mediterranean Archaeology & Heritage Studies* 2: 1–29.

GILLESPIE, S.D. & M. VOLK. 2014. A 3d model of complex a, la venta, mexico. *Digital Applications in Archaeology and Cultural Heritage*.

GROVES, P.D. 2013. Introduction, in *Principles of GNSS, inertial, and multisensor integrated navigation systems*. Boston: Artech House.

HERMON, S. 2008. Reasoning in 3D: a critical appraisal of the role of 3D modelling and virtual reconstructions in archaeology, in B. Frischer & A. Dakouri-Hild (ed.) *Beyond illustration: 2D and 3D digital technologies as tools for discovery in archaeology*: 36–45. http://hdl.handle.net/2027/heb.90045.0001.001.

HILL, A.C., F. LIMP, J. CASANA, E.J. LAUGIER & M. WILLIAMSON. 2019. A New Era in Spatial Data Recording: Low-Cost GNSS. *Advances in Archaeological Practice* 7: 169–77.

HOWARD, P. 2006. *Archaeological surveying and mapping: recording and depicting the landscape*. Routledge.

HOWLAND, M.D., B. LISS, T.E. LEVY & M. NAJJAR. 2020. Integrating digital datasets into public engagement through ArcGIS StoryMaps. *Advances in Archaeological Practice*, 1–10.

HUGGETT, J. 2020. Is big digital data different? Towards a new archaeological paradigm. *Journal of Field Archaeology* 45: S8–17.

KANSA, E.C. 2015. Click here to save archaeology, in E.W. Averett, J.M. Gordon & D.B. Counts (ed.) *Mobilizing the Past*. Grand Forks, ND: The Digital Press at the University of North Dakota.

KEMBEL, S.R. 2008. The Architecture at the Monumental Center of Chavín de Huántar: Sequence, Transformations, and Chronology, in W.J. Conklin & J. Quilter (ed.) *Chavín: Art, Architecture and Culture*. Los Angeles: Cotsen Institute.

KERSEL, M.M. 2016. Response: Living a semi-digital kinda life, in E.W. Averett, J.M. Gordon & D.B. Counts (ed.) *Mobilizing the past for a digital future: The potential of digital archaeology*. Grand Forks: The Digital Press @ The University of North Dakota.

KINTIGH, K. 2006. The Promise and Challenge of Archaeological Data Integration. *American Antiquity* 71: 567–78.

MAGNANI, M., M. DOUGLASS, W. SCHRODER, J. REEVES & D.R. BRAUN. 2020. The digital revolution to come: Photogrammetry in archaeological practice. *American Antiquity* 85: 737–60.

MCCOY, M.D. & T.N. LADEFOGED. 2009. New developments in the use of spatial technology in archaeology. *Journal of Archaeological Research* 17: 263–95.

MORGAN, C. & S. EVE. 2012. DIY and digital archaeology: what are you doing to participate. *World Archaeology* 44: 521–37.

OPITZ, R. & J. HERRMANN. 2018. Recent trends and long-standing problems in archaeological remote sensing. *Journal of Computer Applications in Archaeology* 1: 19–41.

PARCAK, S.H. 2009. *Satellite remote sensing for archaeology*. Routledge.

PERRY, S. & J.S. TAYLOR. 2018. Theorising the digital: A call to action for the archaeological community, in M. Matsumoto & E. Uleberg (ed.) *CAA2016: Oceans ofData proceedings ofthe 44th conference on computer applications and quantitative methods in archaeology*: 11–22. Oxford: Archaeopress.

RASSALLE, T. 2021. Archaeogaming: When archaeology and video games come together. *Near Eastern Archaeology* 84: 4–11.

RICK, J.W. 1996. Total stations in archaeology. *SAA Bulletin* 14.

RICK, J.W. 2018. Total station, in S.L. López Varela (ed.) *The encyclopedia of archaeological sciences*: 1–3. Hoboken, NJ, USA: John Wiley & Sons, Inc.

ROOSEVELT, C.H., P. COBB, E. MOSS, B.R. OLSON & S. ÜNLÜSOY. 2015. Excavation is destruction digitization: advances in archaeeitological practice. *Journal of Field Archaeology* 40: 325–46.

SAPIRSTEIN, P. & S. MURRAY. 2017. Establishing best practices for photogrammetric recording during archaeological fieldwork. *Journal of Field Archaeology* 42: 337–50.

SCHMIDT, S.C. & B. MARWICK. 2020. Tool-driven revolutions in archaeological science. *Journal of Computer Applications in Archaeology* 3: 18–32.

VANVALKENBURGH, P. & J.A. DUFTON. 2020. Big archaeology: Horizons and blindspots. *Journal of Field Archaeology* 45: S1–7.

WATTRALL, E. 2016. Archaeology, the Digital Humanities, and the "Big Tent, in M.K. Gold & L.F. Klein (ed.) *Debates in the Digital Humanities 2016*. Minneapolis, Minnesota: University of Minnesota Press. https://dhdebates.gc.cuny.edu/read/untitled/section/abdd0db0-2eaa-4af7-aac3-7f24ca70ed3b#ch28.

WHEATLEY, D. & M. GILLINGS. 2002. *Spatial Technology and Archaeology: The Archaeological Applications of GIS*. London: Taylor & Francis.

University Policies:

Class in the time of Covid

We can expect that UF's approach to holding classes in face of an ongoing pandemic will evolve as dictated by the public health and political circumstances. In consequence there is no course policy surrounding Covid; rather we will also respond to circumstances as needed. As the semester begins, this entails:

- an expectation of masking in class out of respect for one another,
- a recommendation that everyone get vaccinated in order to minimize both your own risk and the possibility that you will spread the virus to others, and
- flexibility with due dates in case that you are directly impacted by Covid (please discuss with me as needed).

In case anyone is withheld from campus or has reason to feel that risk of exposure in class is too high, you are welcome to discuss with me the possibility of participating in class remotely via hyflex.

Office hours

I will be in my office for office hours, but will also be accessible via Zoom during that time. If you visit in person, please wear a mask.

Attendance Policy, Class Expectations, and Make-Up Policy

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at: catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/

Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, https://www.dso.ufl.edu/drc) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluation

Students are expected to provide feedback on the quality of instruction in this course. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via ufl.bluera.com/ufl/. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results/.

University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor.

Campus Resources:

Health and Wellness

U Matter, We Care: If you or someone you know is in distress, please contact umatter@ufl.edu, 352-392-1575, or visit umatter.ufl.edu/ to refer or report a concern and a team member will reach out to the student in distress.

Counseling and Wellness Center: Visit counseling.ufl.edu/ or call 352-392-1575 for information on crisis services as well as non-crisis services.

Student Health Care Center: Call 352-392-1161 for 24/7 information to help you find the care you need, or visit shcc.ufl.edu/.
University Police Department: Visit police.ufl.edu/ or call 352-392-1111 (or 9-1-1 for emergencies).
UF Health Shands Emergency Room / Trauma Center: For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32608; ufhealth.org/emergency-room-trauma-center.

Academic Resources

E-learning technical support: Contact the UF Computing Help Desk at 352-392-4357 or via e-mail athelpdesk@ufl.edu.
Career Connections Center: Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services career.ufl.edu/.
Library Support: cms.uflib.ufl.edu/ask various ways to receive assistance with respect to using the libraries or finding resources.
Teaching Center: Broward Hall, 352-392-2010 or to make an appointment 352-392-6420.
General study skills and tutoring: teachingcenter.ufl.edu/ Writing Studio: 2215 Turlington Hall, 352-846-1138.
Help brainstorming, formatting, and writing papers: writing.ufl.edu/writing-studio/
Student Complaints: sccr.dso.ufl.edu/policies/student-honor- code-student-conduct-code/

HB-233

In accord with the recent dictates of the Florida State Legislature (HB-233, currently being challenged in court), students are allowed to record video and/or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture *does not* include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.