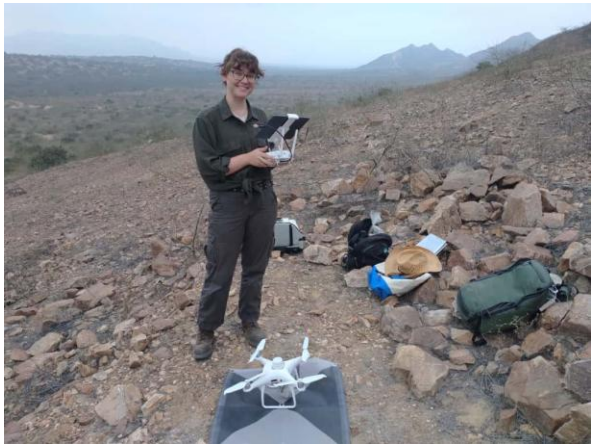
INTENSIVE DRONE & PHOTOGRAMMETRY TRAINING FOR ARCHAEOLOGISTS IN NORTHERN ARIZONA

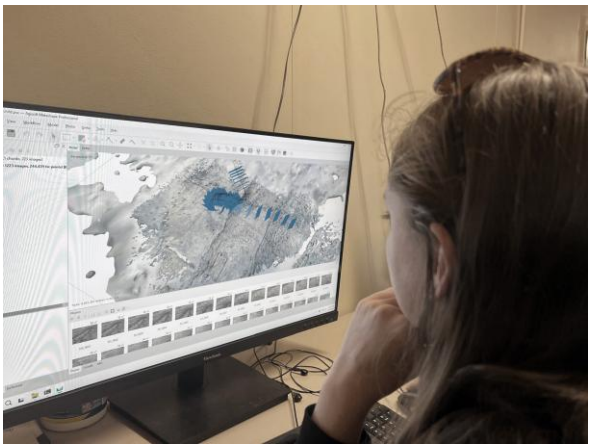
Dec 29, 2025-Jan 9, 2026

Academic Credits: 4 Semester Credit Units (Equivalent to 8 Quarter Units)
School of Record: Culver Stockton College

This program does not provide room and board. Flagstaff is a major tourist destination with a wide variety of restaurants and grocery stores catering for every taste and budget. There are many accommodations options, from short term room sharing rentals (Airbnb, etc.) to boutique hotels. A list of on and off-campus accommodation will be provided during the online orientation.

DIRECTOR:
Dr. Kayeleigh Sharp, RPA – Assistant Teaching Professor, Department of Anthropology, Northern Arizona University (kayeleigh.sharp@nau.edu)





INTRODUCTION

Drones are an essential tool in contemporary archaeological practice, both in academic research and Cultural Resource Management (aka CRM). Drones help to save funds allocated for surveys and to provide excellent spatial information for site detection and regional study. Flying a drone is relatively simple when you know how to do it. In fact, you can learn how to do that in just a few hours. This field school is about all the additional skills, different sensors, drone type, analytics and data interpretation needed to effectively use drones for archaeological investigations.

The first part of this program focuses on practicing basic flight maneuvers, collecting accurate and relevant data and understanding advantages and limitations of different types of equipment while gaining the skills to become a certified drone pilot. During the second part, you will learn about different types of drones (quad and hexacopters, fixed wing, etc) and sensors, how they collect data and what type of data should be used for different goals or research questions. You will then gain hands-on experience processing and analyzing data captured in the field.

Using industry-standard software, GIS platforms, and analytical tools, you will learn state-of-the-art photogrammetric principles, how to create 3D terrain models, the fundamentals of image selection and quality control, the basics of spatial analysis for archaeologists, and professional report writing. All of these skills are essential for both CRM compliance and archaeological academic research. Upon completion, you will have the tools you need for FAA Part 107 certification and to conduct safe and responsible UAV fieldwork and analysis as a professional archaeological drone operator.

IMPORTANT DISCLAIMER

The Center for Field Sciences was established to support field training in a range of sciences at sites within the U.S. & across the world. Traveling and conducting field work involves risk. Students interested in participating in any CFS program must weigh the potential risk against the value of education provided by the program of their choosing.

Risk is inherent in everything we do, and the CFS takes risks seriously. A committee of leading scholars review each field school location prior to approval. Once a program is accepted, the CFS continually monitors conditions at the program's site and so we can provide an experience that is as safe as possible.

The CFS does not provide trip or travel cancellation insurance. Students are encouraged to explore such insurance policies on their own. Post Covid 19, most basic policies do not cover trip cancelation due to pandemics. If you wish to purchase an insurance policy that covers such contingencies, explore Cancel for Any Reason (CFAR) plans. Insuremytrip.com, Squaremouth.com or Travelguard.com are possible websites where students may explore different insurance policies.

Students should be aware that conditions in the field are different than those experienced at home, dorms or college towns. Students will be exposed to the elements, live in rustic accommodation, and expect to engage in daily physical activity.

We do our best to follow schedule and activities as outlined in this syllabus. Yet local permitting agencies, political, environmental, personal, and/or weather conditions may force changes. This syllabus, therefore, is only a general commitment. Students should allow flexibility and adaptability as research work is frequently subject to modification.

All students must consult medical professionals to ensure they are fit to participate in a CFS field program. CFS is not qualified to provide medical advice. For all other concerns, please consult with CFS staff members or program director(s) – as appropriate.

COURSE OBJECTIVES

In this intensive field school, you will master the technical and regulatory fundamentals, understanding drone advantages and limitations according to FAA Part 107 regulations. You will learn how to carry out a non-destructive UAV project from selection of appropriate equipment for specific archaeological applications to data capture. You will also learn how to process and analyze UAV data collected in the field.

The course will take place in the Coconino National Forest in Northern Arizona, approximately 35 miles north of Northern Arizona University in Flagstaff. Students will participate in pre-field bootcamp-style learning activities before moving into the field to test their hands-on skills.

Participants will work in aerial survey crews of two or three people, rotating among various types of equipment and techniques.

In-field experiences will alternate with expert lectures and workshops and self-paced study activities. Students will conduct fieldwork and lab activities under the direction of professional archaeologists and drone pilots who are experts in non-destructive archaeological surveys, in-field data recording, photogrammetry, image enhancement, spatial data analysis and CRM. Planned weekend activities include optional Museum of Northern Arizona, Wupatki, Sunset Crater and Grand Canyon field trips and leisure time.

LEARNT SKILLS

We are aware and strongly support students who seek employment in the Cultural Resource Management sector – whether with private CRM companies or in government compliance agencies. CRM employers seek to understand the skills students learn at the field school. To that end, we are listing all the skills students will learn during this program. At the end of the field school, students will get a Certificate of Completion, where each skill will be ranked at one of three levels:

- ✓ **Basic**: Can perform the skill/task with some supervision.
- ✓ **Competent**: Can perform the skill/task without any supervision.
- ✓ **Advanced**: Can perform the skill/task and teach others how to do it.

Students will be trained in the following skills:

Skill	Description
Compliance-Consultation	Ability to understand the interests and conduct consultation with all relevant stake holders, especially those of indigenes communities
Compliance-CRM State Legislation	Understand how to find and comply with individual state legislation, laws and rules concerning cultural and natural heritage
Compliance-Historic Designation	Understand the criteria through which building and structures may be candidates for a federal historic designation status
Field-Conservation	Ability to conduct initial field conservation and preservation of different artifact types, features & architecture
Field-Data Recording	Ability to use printed or digital sheets to document & record field data
Field-Monitoring	Monitor constructions site and identify danger to cultural or natural heritage
Field-Photography	Ability to take clear images of various features, artifact & soil colors at various light and field depth conditions
Field-Project Management	Understand the logistics, time management, product and HR needs of field projects
Office-Report Writing	Ability to write technical reports in coherent language that follow both federal and state regulations and law
Software-GIS	Can confidently operate Geographical Information System software
Software-Image Editing	Ability to display, create & edit images/graphics in graphic software, such as Adobe Illustrator, Photoshop, etc.
Software-MS Office	Can confidently operate MS Office software, including Word, Excel & PowerPoint
Software-Python	Ability to understand, write and produce software solutions using Python programing
Specialty-Photogrammetry	Ability to create and interpret photographic and electromagnetic radiant imagery & patterns
Survey-Drone Survey	Able to fly a drone and design systematic land coverage, documentation & survey

Survey-General Principles	Ability to conduct & document systematic, pedestrian survey using a topographic map -- printed or digital
Survey-GPS Navigation	Ability to navigate to given coordinates using a GPS receiver
Survey-GPS Recording	Ability to use GPS instruments to conduct, document & record digital spatial survey data
Survey-Map Reading	Ability to read a topographical map, can navigate by compass to and from provided locations
Survey-Map/Plan Making, Digital	Ability to use digital tools (Total Station, differential GPS, etc.) to create maps and plans of a site

COURSE SCHEDULE

Week 1

Time	Activity
Sunday 4:00-8:00pm	Move-in & Arrival Dinner
Monday 8:30-12:00pm	Lecture/Workshop: FAA Part 107 Rules Bootcamp & IACRA registration
Monday 1:30-4:30pm	Field: Pre-Flight, Crew Coordination & Communication & Equipment
Tuesday 8:30-12:00pm	Field: Environmental Awareness & Safety, Obstacle Detection & Emergency Procedures & Basic Maneuvers
Tuesday 1:30-4:30pm	Lecture/Workshop: Crew & Resource Management, Weather & Flight Planning
Wednesday 8:30-12:00pm	Field: Airspace Navigation & Archaeological Site Survey Practice (100 m +)
Wednesday 1:30-4:30pm	Lecture/Workshop: Map reading, Airspace & VFR Charts
Thursday 8:30-12:00pm	Field: Airspace Navigation & Near-Earth Site Feature Survey
Thursday 1:30-4:30pm	Lecture/Workshop: Pilot & Aircraft Performance
Friday 8:30-12:00pm	Field: Team Site Survey
Friday 1:30-4:30pm	Lecture/Workshop: Airspace/VFR Charts
Asynchronous Tutorials	Practice Exam
Saturday 8:00am-2:00pm	Sunset Crater/Wupatki visit

Week 2

Time	Activity
Sunday	Free Day, optional Visit to Grand Canyon
Monday 8:00-1:00am	Photogrammetry Basics – Principles, image quality, overlap, and ground control
Monday 1:00-4:00pm	Reporting & Visualization Standards
Tuesday 8:00-11:00am	Data Processing & Model Building – Software training (e.g., Agisoft Metashape), 3D model creation
Tuesday 1:00-4:00pm	Interpretation & Exporting Visualizations
Wednesday 8:00-11:30am	GIS Integration – Importing drone data into GIS, georeferencing, layering
Wednesday 1:00-4:00pm	3D Image Analysis & Quality Check
Thursday 8:00-11:00am	Basic Spatial Analysis – Kernel Density, site clustering, visibility analysis
Thursday 1:00-4:00pm	Advanced Reflectance Transformation Imaging & Analytical Techniques
Friday 8:00-11:00am	Final Presentation Development
Friday 1:00-4:00pm	Informal Expo & Presentation of findings
Friday Evening 6:00-8:00pm	Farewell Party & Certificate Ceremony

** Course schedule may be subject to change upon directors' discretion based on weather conditions or other limiting factors*.

TYPICAL WORKDAY

The first week is dedicated to instruction, site visits and preparation for research at Deadman Wash. From the second week forward, students will follow this daily schedule:

Time	Activity
7:00am	Departure for Deadman Wash
8:30am	Work begins in the study area
10:00-10:15am	Morning break
11:30am-12:00pm	Lunch at the site
1:30-4:00pm	Expert Lecture & Workshop Activities
4:00-5:00pm	Student Support for Asynchronous Tutorials & Exam Prep

** In case of inclement weather days, lectures and lab work will be performed.*

TRAVEL & MEETING POINT

We suggest purchasing refundable airline tickets. The program and directors will take a close look at local weather conditions 2 weeks prior to the beginning of the program and will make a Go/No Go/Contingency Plan decision by then. This will protect students from potential loss of airline ticket costs if we are forced to cancel a program due to inclement weather or unforeseen regional closures.

Students will meet with project staff members on Sunday, the first day of the field school, at 12:00pm at Northern Arizona University, Digital Archaeology Laboratory. The laboratory is located in Building #52, Bilby Research Center.

If you missed your connection or your travel is delayed, please call, text or email the project director immediately. Local emergency cellular phone contact information will be provided to all enrolled students.

Figure 1: Bilby Research Center, 15 E Runke Dr Flagstaff AZ 86011

ATTENDANCE POLICY

The required minimum attendance for the successful completion of the field school is 95% of the course hours. Any significant delay or early departure from an activity will be calculated as an absence from the activity.

An acceptable number of absences for medical or other personal reasons will not be considered if the student catches up on the field school study plan through additional readings, homework, or tutorials with program staff members.

PREREQUISITES

None. This is a hands-on, experiential learning opportunity and students will study on-site how to conduct archaeological research under the direction of a range of specialists in the field. Field work involves physical work and exposure to the elements and thus requires a measure of understanding that this will not be the typical university learning environment. You will have to work outdoors in physically demanding environments, and students must plan ahead for both cold and hot weather conditions. Students are required to come equipped with sufficient excitement and an adequate understanding that fieldwork requires real, hard work, in the sun and wind and perhaps even snowy conditions. The work requires patience, discipline, and attention to detail.

ACADEMIC GRADING MATRIX

Students will be graded based on their work as follows.

50%: Attend and participate each scheduled day, including lecture and field and laboratory work
30%: Keep a field notebook that will be submitted and evaluated at the end of the course
10%: An exam taken at the end of the first week of field school, testing students on required readings and initial formal lectures.
10%: Participate in daily reports of research activities with the group

MEALS & ACCOMMODATIONS

This program does not provide room or board. Flagstaff is a major tourist destination with a wide variety of restaurants and grocery stores catering for every taste and budget. There are many accommodations options – from short term room sharing rentals (Airbnb, etc) to boutique hotels – in a wide range of prices.

Students are responsible for finding their own accommodation and food. Several restaurants are within walking distance from our lab space on NAU campus.

A list of on and off-campus accommodation will be provided during the online orientation.

VISA REQUIREMENTS

This is a domestic program, and no visa is needed for U.S. Citizens.

Non-US Citizens are asked to check the United States embassy website at their home country for specific visa requirements.

PROGRAM ETIQUETTE

Life in the communities around Flagstaff is focused on the outdoors. No excessive or underaged alcohol consumption, and absolutely no marijuana consumption is allowed in the project. Students are expected to obey local laws and are encouraged to observe a 9:00 pm curfew Monday-Friday in order to start field and lab work early each day.

Flagstaff is a diverse community with folks attracted to the area from around the world. The atmosphere is laid-back, touristic and collegiate. There will be several occasions to enjoy the local city spirit and experience some of the most beautiful landscapes in North America. When traveling in the area, you are expected to be a conscientious and well-informed visitor, observing safety first.

You will also have many opportunities to meet and work alongside local university and community members. As such, each student is expected to be a project ambassador. You are thus expected to be patient, kind, and courteous with peer participants and in public.

EQUIPMENT LIST

- A pair of sturdy working shoes (thick-soled sneakers or light-weight hiking shoes) and a comfortable pair of shoes for walking in semi-rugged terrain.
- Clothing suitable for outdoor work: a wide-brimmed hat and sturdy lightweight clothing with long sleeves and long pants (to protect against the equatorial sun, insects, and thorns).
- A professional looking business-casual outfit for special events and activities.
- Comfortable house clothes for relaxing after field work.
- Both lightweight jacket and heavy coat as weather conditions change rapidly in northern Arizona.
- One or two reusable water bottles to pack into the site.
- Sunscreen.
- A small backpack for your water bottle, snacks, cellular, etc.
- A positive attitude towards work, fun, study, and discovery!

PRACTICAL INFORMATION

International dialing code: 001 (if dialing from outside the US)

Money/Banks/Credit Cards: USD$

ATM availability: Many ATM machines are available throughout Flagstaff

Local Language: English

Measure units: degree Fahrenheit (ºF), foot/yard/mile, pound (lb), quart/gallon.

Field units: Meter (m.), Gram (gr.)

Time zone: Local time is Mountain Standard time.

ACADEMIC CREDITS & TRANSCRIPT

Attending students will be awarded 4 semester credit units (equivalent to 6 quarter credit units). Students will receive a letter grade for attending this field school based on the assessment matrix (above). This program provides a minimum of 80 direct instructional hours. Students are encouraged to discuss the transferability of credit units with faculty and the registrar at their home institutions prior to attending this program.

Students will be able to access their transcript through our School of Record – Culver-Stockton College. C-SC has authorized the National Student Clearinghouse to provide enrollment and degree verification (at https://tsorder.studentclearinghouse.org/school/select). Upon completion of a program, students will get an email from C-SC with a student ID that may be used to retrieve transcripts. The first set of transcripts will be provided at no cost. Additional transcripts may require payment. If you have questions about ordering a transcript, contact the C-SC office of the registrar at registrar@culver.edu.

REQUIRED READINGS

Campana, Stefano. "Drones in archaeology. State-of-the-art and future perspectives." *Archaeological Prospection* 24.4 (2017): 275-296.

Field, Sean, Matt Waite, and LuAnn Wandsnider. "The utility of UAVs for archaeological surface survey: A comparative study." *Journal of Archaeological Science: Reports* 13 (2017): 577-582.

Pecci, Antonio. "Digital survey from drone in archaeology: potentiality, limits, territorial archaeological context and variables." *IOP Conference Series: Materials Science and Engineering*. Vol. 949. No. 1. IOP Publishing, 2020.

Themistocleous, Kyriacos. "The use of UAVs for cultural heritage and archaeology." *Remote Sensing for Archaeology and Cultural Landscapes: Best Practices and Perspectives Across Europe and the Middle East*. Cham: Springer International Publishing, 2019. 241-269.

RECOMMENDED READINGS

Anderson, R. Scott, Damara Kautz Strong, and Paul Whitefield. “Late Holocene Palaeoenvironments within Northern Arizona’s Wupatki - Anaasazi Bikin Region, in Relation to Northern Sinagua Occupation.” *Vegetation History and Archaeobotany*, 2025. https://doi.org/10.1007/s00334-025-01050-x.

Khelifi, Adel, et al. "Autonomous service drones for multimodal detection and monitoring of archaeological sites." *Applied Sciences* 11.21 (2021): 10424.

Qubaa, Abdalrahman R., Alaa N. Hamdon, and Taha A. Al Jawwadi. "Morphology detection in archaeological ancient sites by using UAVs/drones data and GIS techniques." *Iraqi Journal of Science* (2021): 4557-4570.

Rinaudo, Fulvio, et al. "Archaeological site monitoring: UAV photogrammetry can be an answer." The International archives of the photogrammetry, Remote sensing and spatial information sciences 39 (2012): 583-588.