PHOTOGRAMMETRY AT PISTIROS, BULGARIA

Course ID: HIS 489

Aug 18-24, 2024

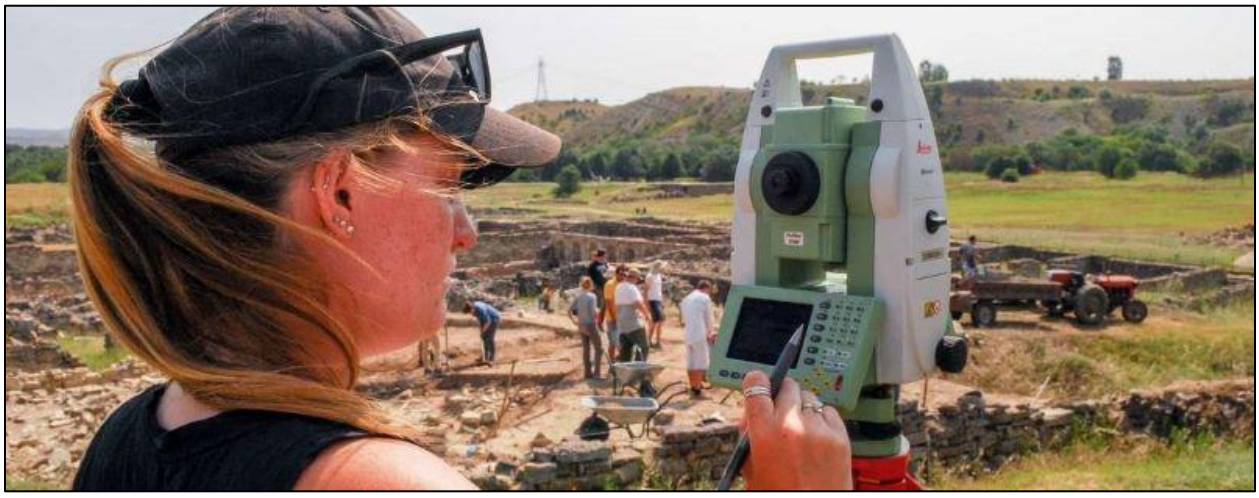
Academic Credits: 1 Semester Credit Unit (Equivalent to 1.5 Quarter Units)

School of Record: Culver Stockton College

DIRECTORS:

Dr. Angela Pencheva, Co-Founder of Balkan Heritage Foundation, Adjunct Professor at CPCE, New Bulgarian University (Bulgaria) & ICCM Board Member (balkanheritage@gmail.com)

Ms. Kristen Jones, Ph.D. Candidate in Geography, MA in Classics and Archaeology, Queen's University, Canada (k.jones@queensu.ca)



INTRODUCTION

This is an introductory program designed for professionals and students who wish to learn the basics of Photogrammetry. Photogrammetry is the art, science, and technology of obtaining reliable information about physical objects and the environment through processes of recording, measuring, and interpreting photographic images and patterns of recorded radiant electromagnetic energy. This program will expose students to data collection using Total Station, aerial Photogrammetry, Object Photogrammetry, and the use of Agisoft Metashape software to render and study the results.

This field schools will use the site of Pistiros – an Ancient Greek trade center (*emporium*) in the heart of Thrace – as the case study for training purposes. Notwithstanding the above, this program is not limited to archaeologists. Architects, Urban Planners, Geologists, Geographers, and a broad range of other professionals using photogrammetry are welcome to attend.

While short, this program provides all the necessary tools for professionals and students to record, render and interpret spatial and photographic data. Graduates will be able to understand concepts, operate tools and build objects and landscapes using data acquired through the different instruments used.

IMPORTANT DISCLAIMER

The Center for Field Sciences was established to support field training in a range of sciences at sites 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 for the program sites of their choosing.

Risk is inherent in everything we do and the CFS takes risk 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 site, its academic quality and ability to conduct as safe of an experience 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.

You should be aware that conditions in the field are different than those you experience in your home, dorms or college town. You will be exposed to the elements, live in rustic accommodation, and expect to engage in physical activity daily.

We do our best to follow the schedule and activities as outlined in this syllabus. Yet local permitting agencies, political, environmental, personal, 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 change.

All students must consult medical professionals to ensure they are fit to participate in this program. If you have any medical concerns, please consult your doctor. For all other concerns, please consult with the program director – as appropriate.

COURSE OBJECTIVES

By the end of the program the participants will know:

- How to set up a Total Station using an existing datum and control network.
- How to measure points using a Total Station and export data to a computer.
- How to plan data collection for photogrammetry - setting areas for documentation, determining accuracies, type of photography (terrestrial/aerial), setting limits, flight planning for DJI drones, laying out targets, color charts, etc.
- How to take photos terrestrially for photogrammetry.
- How to fly a drone for aerial photogrammetry.
- How to process data from both terrestrial and aerial photogrammetry projects.
- How to interpret data results - 3D models, point clouds, and true orthophotos.

LEARNT SKILLS

We are aware that many students may not seek academic careers but will pursue employment in the private sector. To that end, we are following the Twin Cairns Skills Log Matrix™ (https://twincairns.com/skills-log-matrix/) and will provide training for the following skills:

Skill	Skill Definition
Cartography Principles	Understand cartographic principles and can create easy-to-understand maps
Geodesy	Ability to understand and create products taking into effect earth's figure, orientation and space and how it changes over time
Photography	Ability to take clear images of various feature, artifact & soil colors at various light and field depth conditions
Data QA/QC	Ability to use Quality Assurance & Quality Control systems to measure and assure the quality of a product or service and the process of ensuring products and services meet consumer expectations.
Public Interpretation	Ability to understand site history and provide clear and coherent interpretation for the public
AutoCAD Software	Can confidently operate Computer Aided Design & Drafting software
Image Editing software	Ability to display, create & edit images/graphics in graphic software, such as Adobe Illustrator, Photoshop, etc.
Drone Survey	Able to fly a drone and design systematic land coverage, documentation & survey
Map/Plan Making, Digital	Ability to use digital tools (Total Station, differential GPS, etc.) to create maps and plans of a site
Total Station	Know how to properly set a Total Station, take back and fore points, collect geospatial data/points that can be used to generate digital topographic maps
Photogrammetry	Ability to create and interpret photographic and electromagnetic radiant imagery & patterns

SKILLS MATRIX LEVELS

The school instructors will evaluate the level each student achieved on the Twin Cairns Skills Log Matrix™ skills list provided above. Each skill will be graded on one of the following 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.

COURSE SCHEDULE

Date	Activity
Aug 18	Arrival and check-in by 7:00pm 8.00 pm – Lecture: Advantages of Computational Photography for Archaeological Excavation (basics of what kind of data and results can be obtained - site level, excavation level, object level)
Aug 19	**Morning**: Lecture - Introduction to the Sites / Control Network & Surveying Basics **Afternoon**: Lecture & Workshop Advantages of Computational Photography for Archaeological Excavation (basics of what kind of data and results can be obtained - site level, excavation level, object level) Introduction to Technical Photography
Aug 20	**Morning**: Field Training - Total Station Set-Up & Operation (three groups) **Afternoon**: Lecture & Workshop - Planning Photogrammetric Projects
Aug 21	**Morning**: Field Training - Terrestrial Photogrammetry & Aerial Photogrammetry (two groups) **Afternoon**: Lecture & Workshop - Photogrammetric Data Processing
Aug 22	**Morning**: Field Training - Terrestrial Photogrammetry & Aerial Photogrammetry (two groups)

	Afternoon: Lecture & Workshop - Using 3D Data for Analysis
Aug 23	**Morning**: Field Training - Practicing All Techniques Together, Lecture & Workshop - Photogrammetric Data Processing **Afternoon**: Visit to the ancient town of Plovdiv – European capital of Culture 2019*
Aug 24	Departure. Check-out by 12:30pm

** Course structure may be subject to change upon directors' discretion.*

TYPICAL WORKDAY

Students will follow this daily schedule during the one week of lab work.

7:15- 8:00am Breakfast
8:00am-12pm Field Training
1:00-2:00pm Lunch
4:00-7:30pm Lectures and workshops
7:30- 9:00 pm Dinner

ACADEMIC GRADING MATRIX

Students are required to participate in all components of the field school. Grades are determined as follows:

- **40% - Field work:** Effectively use of equipment to produce actionable spatial data.
- **40% - Lab Work:** Ability to translate data into accurate digital models for analysis and interpretation.
- **10%** - **Communication & Presentation**: Ability to communicate results and understanding in a presentation format at the end of the program
- **10% - Attendance, Demonstrated diligence and Active participation**

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

There are no prerequisites for participation in this field school. Note that field photogrammetry work is done in the open, where students are exposed to the elements. You must be physically fit to move around in the heat and humidity throughout the day. Students will be taught how to use a variety of photogrammetry procedures and equipment – from Total Station to drones. Work is slow and may be tedious. It requires patience and focus.

PROGRAM ETIQUETTE

Bulgaria, one of Europe's oldest countries, boasts a diverse and extensive history spanning many centuries, influenced by various civilizations. From the ancient Thracians to the Roman Empire and the Byzantine era, Bulgaria's past reflects its resilience and cultural richness. Its strategic location as a crossroads between East and West has shaped its identity, evident in its architecture, cuisine, and traditions. Today, Bulgaria stands as a vibrant nation blending its storied past with modern aspirations, welcoming visitors to explore its timeless landscapes and captivating history.

Bulgarians take pride in their heritage and achievements, and we kindly ask for your respect towards their customs, traditions, and culture.

EQUIPMENT LIST

- Participants are expected to bring clothing suitable to the workshop's environment (both urban areas and countryside) and the weather conditions from hot and sunny to chilly and rainy. Light clothes and hats for sunny days as well as raincoats for probable rainy and windy days are recommended.
- Comfortable shoes - visiting some of the sites requires walking on country roads and medieval cobblestone streets.
- Wide brim hat
- A small backpack (for your water bottle, snacks, camera, etc.)
- Swimming suits and sunscreen
- Medication - only prescription medicines you may need. It is not necessary to bring non-prescription medicine from your country since you can buy all basic non-prescription drugs in Bulgaria.
- Camera: The program will have cameras available but participants are encouraged to bring their own cameras if possible. Suitable cameras include those that can be operated in a fully manual mode such as DSLR cameras or some mirrorless cameras. Cell phone cameras will not be suitable.
- Computer: The program will have a demonstration computer available, but it is strongly encouraged for participants to bring their own computer for firsthand experience with field data processing. An external mouse and SD card reader is also strongly encouraged.
- Software: The program will be utilizing software that is available for trial during the workshop. No software purchases will be necessary.

TRAVEL & MEETING POINT

We suggest you hold purchasing your airline ticket until six (6) weeks prior to departure date. Natural disasters, political changes, weather conditions and a range of other factors may require the cancelation of a program. The CFS typically takes a close look at local conditions 6-7 weeks prior to program beginning and makes a Go/No Go decision by then. Such a time frame still allows for the purchase of deeply discounted airline tickets while protecting students from potential loss of airline ticket costs if CFS is forced to cancel a program.

The field house is at Villa Terres (in the Village of Karabunar), about 84km/52mi southeast of Sofia – Bulgaria's capital. Students should plan to fly to the Sofia International Airport (SOF). Students can make their way to the field house on their own or use a shuttle service reserved by the project director.

The shuttle service will depart Sofia Airport Terminal 2 arrival area at 4:00pm on Sunday. The cost is 60-85 Bulgarian Lev (approximately $50) – depending on the number of students who choose to use this service. Cost must be paid in cash. You can withdraw Bulgarian Lev from several ATM machines at the airport.

Personal transfer can be arranged. The cost will depend on date and time of arrival.

VISA REQUIREMENTS

There are no special visa requirements for U.S. citizens traveling to Bulgaria, if they do not stay longer than 3 months. Passport's expiration date should exceed the stay by at least 3 months.

Citizens of other countries are asked to check the embassy website page at their home country for specific visa requirements.

MEALS & ACCOMMODATIONS

Accommodation will be at the at Villa Terres hotel, a modern winery and hotel complex. Rooms are with two to three beds (bathrooms with shower and WC), equipped with AC & TV. The hotel has a small swimming pool and SPA, free of charge to participants of the field school. Cheap laundry services and free Wi-Fi is provided.

The region is known for its wines and drinking age in Bulgaria is 18. Do note, however, that public intoxication is frown upon in Bulgaria and is not welcomed at this project.

Three meals per day of fresh, organic Bulgarian homemade food are covered by the tuition for this program. Meals usually take place at the hotel's restaurant. Requests for vegetarian food are accepted. Brown-bag lunches will be provided for excursions.

Participants are welcome to stay longer and enjoy the Villa Terres hotel, its amenities, and the surrounding wine country. Please communicate with the program directors about extending your stay at the hotel.

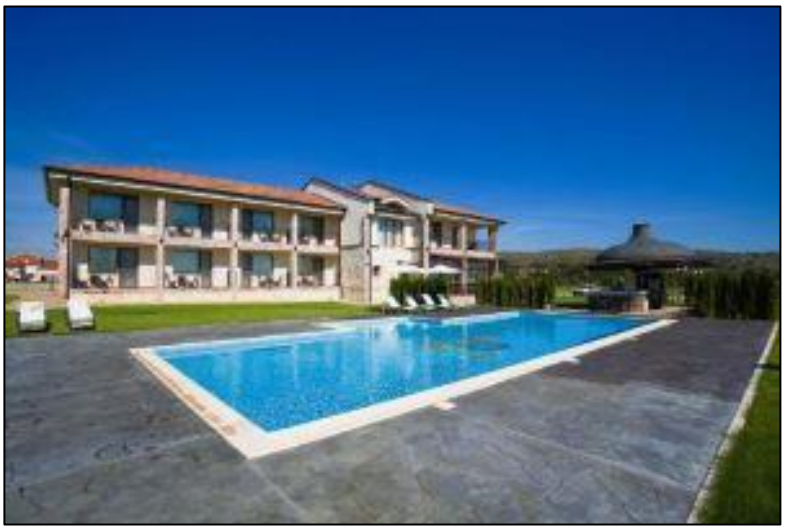


Figure 1: Villa Terres Hotel at Karabunar

Figure 2: Terminal 2 at Sofia Airport

PRACTICAL INFORMATION

International dialing code: The Bulgaria international phone code is +359.

Money/Banks/Credit Cards: Bulgaria's currency is the Lev. Participants can withdraw cash at the airport ATM before departure for the initial days and for the transfer shuttle. ATMs are also available in the nearby city of Septemvri for later use.

ATM Availability: See above

Local Language: The native language is Bulgarian. Bulgaria sees many international tourists and many Bulgarians, especially young folks, speak at least some English.

Measurement units: degree Celsius (ºC), meter (m.), gram (gr.), liter (l)

ACADEMIC CREDITS & TRANSCRIPT

Attending students will be awarded 2 semester credit units (equivalent to 3 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

Albertz, J. 2007. A Look Back: 140 Years of 'Photogrammetry': Some Remarks on the History of Photogrammetry. Photogrammetric Engineering & Remote Sensing, 504-506.

Dallas, R.W.A. 1996. Architectural and Archaeological Photogrammetry. In Close Range Photogrammetry and Machine Vision ed. K.B. Atkinson. Wittles Publishing: Caithness. 283-302.

Grussenmeyer, P., Hanke, K., & Steilein, A. 2002. Architectural Photogrammetry. In Digital Photogrammetry ed. M. Kasser & Y. Egels. Taylor & Francis, 300-339.

RECOMMENDED READINGS

Jones, K., & Bevan, G. 2019. A Photogrammteric Workflow for Rapid Site Documentation at Stobi, Republic of North Macedonia. International Archives of the Photogrammetry, Remote Sensing & Spatial Information Sciences XLII-2/W11, 631-658.

McGlone, J. & Lee, G., 2013. Manual of Photogrammetry Sixth Edition. ASPRS: Maryland.

Raykovska, M., Jones, K., Vasilev, I. 2023. A Photographic Documentation Workflow for Digitization of Cultural Heritage: the 14th Century Church of Sv. Nikola in Kalotina, Bulgaria. International Archives of the Photogrammetry, Remote Sensing & Spatial Information Sciences XLVIII-M-2, 1287-1293.

Remondino, F. and Fraser, C., 2006. Digital Camera Calibration Methods: Considerations and Comparisons. International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences 36(5), 266-272.

Wolf, P.R., Dewitt, B.A. and Wilkinson, B.E., 2014. Elements of Photogrammetry with Applications in GIS. McGraw-Hill Education.

Waldhaeusl, P., Ogleby, C., 1994. 3x3-Rules for Simple Photogrammetric Documentation of Architecture. International Archives of Photogrammetry and Remote Sensing XXX(5), 426-429.