



Cave Survey & Cartography

June 8-14,2025

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Course Description:

This course focuses on the following:

- fundamentals of in-cave field mapping and inventory (digital and manual)
- georeferencing data and use of LIDAR data,
- digital cartography, and the production of cartographic representations of caves and karst features.

Instruction will be at the beginning and intermediate experience levels. Mornings will include lectures, demonstrations, and instruction on survey technique with a strong emphasis on recording field data and sketching in digital and manual formats. Afternoons will cover in-cave instruction and practice with field data collection, recording of survey and inventory data, and producing representative field sketches of cave passages and features. Evenings will focus on transforming field notes into maps and will cover all aspects of digital drafting and cartographic design . By the end of the course, students will be able to conduct basic field mapping including in-cave sketching, feature inventory, transformation of survey data into line plots including inventory data, construct and digitally draft cave maps, and make overlays of cave/inventory data with digital topographic maps, LIDAR, and Google Earth imagery. Throughout the course, participants will work with the course instructor to produce cave maps and other derivative products from survey/inventory data. Optional: Instructor will work with those students wishing to extend their data to GIS applications.

The course will take place at Hamilton Valley Field Station located just outside of Mammoth Cave National Park. See <http://karstfieldstudies.com/logistics.php> for additional information about housing. Participants must be in reasonably good physical condition to negotiate the cave passages and surface hikes which are a major component of this course. Much time will be spent conducting cave surveys/inventories in various caves in the area and in producing cave maps from the data. Attendance: Morning class sessions begin at 8:30 am and break at 11:30 am for lunch. Afternoon sessions will begin at 1:00 pm and will typically return from field sites by 5:00 pm. There will be a two-hour break for dinner after which will be instruction on data

processing and digital cartography. Participants enrolling for academic credit will be expected to participate in all in-class and field sessions. Participants who participate in the majority of class activities will receive a Certificate of Participation.

Required Text and Equipment:

Students are encouraged to bring their own laptops. There are no required textbooks for the course but participants will receive software and handouts/publications that relate to class topics. Students with Disabilities: Because of the nature of the Karst Field Studies program, all participants must be in good physical condition to take these courses. However, in compliance with university policy, students with disabilities who require accommodations (academic adjustments and/or auxiliary aids or services) for this course must contact the Office for Student Disability Services in Downing University Center A-200. The OFSDS telephone number is (270)745-5004; TTY is (270)745-3030. Per university policy, please DO NOT request accommodations directly from the professor or instructor without a letter of accommodation from the Office for Student Disability Services.

Attendance: Students are expected to participate in all classes and field trips, except under special conditions (e.g., health). Field trips involve easy to moderately challenging caving. In the rare circumstance that students are unable to fulfill the field requirements they will be invited to drop the course. In general the rigor of the trips are adjusted to the abilities of the class. **All participants will receive a Certificate of Participation on the last day of the class for their full participation in the class. This does not constitute the final grade for those taking the course for academic credit.**

Grading: Courses can be taken as non-credit workshops, Undergraduate and Graduate credit, or for Continuing Education Units. Students who take the course for credit will develop an independent research project in consultation with the instructors during the week, which must be completed by August 2023. A standard grading system will be used in the class (90-100% = A, 80-89% = B, 70-79% = C, 60-69% = D, below 60% = F).

General Class Conduct and Policies: During class periods, cell phones should be turned off and smoking is not allowed. While in cave, safety and conservation are primary concerns. On the surface, it is essential to drive carefully and to obey the speed limit. Beware of snakes, ticks, chiggers, and poison ivy. ** Cell phones should be turned off during class! ** Please treat your colleagues and their desire to learn with appropriate respect.

Course Logistics: The website (<https://www.karstfieldstudies.com/copy-of-registration>) has links to Accommodations, Equipment and Supply Lists, and Caving Vendors. Carefully read and heed the suggestions on caving equipment!. Students will be expected to provide a caving helmet, three independent sources of light (two must be helmet-mounted) with spare batteries

and knee pads. In addition students should bring a small, sturdy backpack in which to carry a water bottle, snacks, class equipment, etc.

Schedule Change Policy: The Department of Earth, Environmental, and Atmospheric Sciences strictly adheres to University policies regarding schedule changes. It is the responsibility of the student to meet all admissions deadlines. Only in exceptional cases will a deadline be waived (you will be required to fill out an appeal form). The form requires a written description of the extenuating circumstances involved and the attachment of appropriate documentation. Poor academic performance, general malaise, or undocumented general stress factors are not considered as legitimate circumstances.

TENTATIVE SCHEDULE

Course Overview: (Sunday)

7:00-9:00pm

Introduction, discussion of course outline. Student experience survey. Display of survey instruments, field data, maps and other digital representations.

Lecture topics:

- Overview on software/hardware for data collection, reduction, cartography.
- Why do we map caves? What is the purpose of the cave map?
- Overview on data collection/survey standards for class. Low impact surveying methods, digital data collection, digital cartography, georeferencing maps (use of GPS with cave survey, LIDAR data)

Day 1 (Monday)

8:30-11:30 am

Lecture topics:

- Basics of cave survey/inventory, classroom exercise
- Introduction to “paperless” field data collection
- Sketching to scale
- Surface and in-cave quality control techniques
- Underground teamwork
- Using GPS with cave survey

Noon-1:00pm lunch break at Hamilton Valley

1:00-4:30pm

- In-cave mapping at Adwell Cave – GPS tracklog to cave and entrance location.
- Cave survey *Novice*: emphasis on plan view, *Intermediate*: cross sections with plan

4:30-6:30pm dinner break at Hamilton Valley

6:30-9:00pm

- Demonstration of various plots and representations of cave passage
- Cave survey data entry and quality control
- Magnetic declinations
- Class work: Transforming field notes into a digital cave map
- Data reduction from field exercise
- Introduction to digital cave cartography techniques

Day 2 (Tuesday)

8:30 – 11:30 am

Lecture topics:

- Introduction to Cross sections and profiles
- Introduction to georeferencing cave data
- Acquisition of georeferencing data (LIDAR, Digital topographic and geological/hydrological data)

Noon-1pm Lunch at Hamilton Valley

1:00-5:30p

- In-cave mapping (Dogwood Cave) with plan, profile and cross sections, resource inventory

5:00-7:00 pm dinner break at Hamilton Valley

7:00-9:30pm

- Class work: Cartographic representations from days field exercises
- Optional: Resource inventory database – constructing a simple spreadsheet for inventory data.
- Downloading topographic maps, LIDAR data, georeferencing cave data:

Day 3 (Wednesday)

8:30-11:00 am

Lecture topics:

- Passage delineations using Disto
- Cross sections and vertical profiles – continued

11:30 – 1:00 Lunch in Horse Cave

1:00-5:30pm

- In cave mapping in Hidden River Cave.
- GPS tracklog to cave, GPS entrance
- Use of laser disto for mapping entrance sink
- Novice: Cross sections with triangulations
- Intermediate: (plan, cross sections & profile)

6:00-7:00pm dinner break at Hamilton Valley

7:00-9:30pm

- Class work: Digital cartography using today's field notes
- Continue working on cartographic projects

Day 4 (Thursday)

8:30-10:00am

Lecture topics:

- Profiles (continued)
- Sketching large cave passages and rooms, clipboard sketching
- More on cave inventories

10:30am-4:00pm (bring in-cave lunch)

- In-cave mapping exercise: Cave TBD – mapping a large trunk passage and chamber
Novice: plan view, cross sections on clipboard
Intermediate: plan view, profile, cross sections, resource inventory in GIS(optional)

5:30-7:00 dinner break at Hamilton Valley

7:00-9:00pm

- Class work: Digital cartography using today's field notes
- Continue working on cartographic projects from previous days

Day 5 (Friday) Bring in-cave lunch

8:30 – 3:30 In-cave mapping exercise: Survey in Cathedral Domes area of Mammoth Cave
Mapping complex passages, loops, passage delineations

4:00-6:00pm dinner break at Hamilton Valley

6:00-9:00pm Data entry, cartography for day's exercise
Digital cartography continued – finish class projects

Day 6 (Saturday)

8:30-10:30am - Course wrap-up.

Discuss cartographic projects for those taking the class for credit.