



Syllabus

## **Karst Geomorphology: Field and Numerical Techniques**

June 20-26, 2020

GEOG 475, GEOL 475, and GEOS 510

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**Course Instructors:** Dr. Aaron Bird and Rachel Bosch

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**WKU Program Leader:** Dr. Leslie A. North

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**Supplies:** Participants should plan to bring a ruler, protractor, pencils, field notebook, laptop, camera or smartphone with camera

**Required software and reading materials:** Please arrive for class with the following software packages already installed on your laptop: visual SfM, anaconda python, vlc for frame extraction, openfoam, QGIS, google earth. If you have trouble with installation, email the instructors so that we can help you before class begins.

**Course Objectives:** Through workshop exercises and field trips, students will gain an appreciation of the theory behind numerical simulation techniques, demonstrate skills in field work to collect data about karst systems, and communicate understanding of models of geological processes that can lead to karst landforms.

By the end of this course, students will be able to:

- 1) critically read karst research literature, identify assumptions made, develop understanding of research techniques used, and discuss the research conclusions with others.
- 2) use selected software tools to conduct numerical modeling of karst systems for the purposes of analysis, interpretation, and education.

3) apply appropriate tools and techniques to gather and analyze field data in order to develop understanding about karst systems.

**Expectations:** Due to the amount of course content that will take place in the field, participation in all class activities is a must. Participants that are enrolled in the course for college credit must participate in all course activities to receive credit – no exceptions! It is strongly recommended, that all participants eat breakfast each morning so we can avoid cavers “burning out” in the cave.

Participants are also required to follow all safe caving practices!

Our first priority in caving is safety. We will not tolerate cavers who are not following instructions and putting their safety or the safety of others at risk.

Our second priority is resource protection. We have been given a unique opportunity to visit places in Mammoth Cave that very few will ever get the opportunity to see. We will take every precaution to protect all cave resources and to have as little impact on the cave as possible. Once again, we will have zero tolerance for participants who are not respecting the resource protection policy.

Our third priority (and the purpose of this course!) is education. We fully expect to have a great time together this week. Caving is one of the most enjoyable things in the world. We will all meet new people and make new friends this week. We must remember why we are here – to learn about geomorphology at Mammoth Cave! Have a great time this week, just remember why we are here!

#### **Equipment and Supply List:**

*Note: to avoid potential transmission of white-nose syndrome to bats in the cave, the Park Service requires that clothes and equipment used in one part of Mammoth Cave be thoroughly cleaned before being used in another part. Our schedule changes from Mammoth during the first 3 days to Flint Ridge during the last 3 days. A disinfectant will be available to treat helmets and equipment, but for cave clothes it is easier to change to fresh items kept in a separate sealed plastic bag. White-nose syndrome has been identified in Mammoth Cave National Park, but it is still necessary to follow these precautions. WNS, caused by a fungus, is fatal to hibernating bats but does not affect humans. For details, visit [www.caves.org](http://www.caves.org) and click on WNS.*

1. **Helmet** (for caving trips) with non-elastic chin strap, quick-release buckle, and three or four-point suspension. The helmet should stay on during a fall but be easily

released if it should become wedged. The helmet will also be the mounting point for your primary light source, so any accommodation for attaching a headlamp is a plus.

2. **Two (2) lights that can be helmet mounted.** REI or other outdoor outfitters carry suitable lights for caving. Bring extra batteries.
3. **Flashlight** with extra batteries and extra bulb (ex. Mini-Maglite)
4. **Sturdy boots** with non-skid soles (comfortable, hiking, water resistant is good).
5. Caving coveralls are ideal, but a suitable alternative is **rugged clothing** that can withstand outdoor activity. These include comfortable pants or jeans that you can afford to get dirty. To keep you warm in the 56°F, almost 100% humidity, underground environment you'll need to dress in layers. It is strongly advised that you have a thermal layer top (polypro or equivalent) and a bottom. If you are not using coveralls, then a long-sleeve shirt is strongly recommended. You will be underground most days, so be prepared with some clean changes of clothes. There will not be enough time to do laundry each day.
6. **Gloves** (garden type is ok, to protect hands and for gripping)
7. **Knee pads** (These are very helpful in protecting your knees). Basketball or other athletic-type knee pads are good.
8. **Small to moderate size day-pack** to hold batteries, jacket, clothing, supplies. A large backpack will be too bulky for narrow cave passages.
9. **Water Bottle** (fill before going on trips, to keep hydrated)
10. **Snack foods** suitable for long underground hiking trips— such as granola-type bars, small cans of fruit, dried fruit, trail mixes, beef or other jerky – similar to what you would take on a long day hike on the surface.
11. **Rain Gear** (layers of clothing for severe weather, umbrella, rain jacket, etc.)
12. **Food** if you are staying at Hamilton Valley Facility, which has a fully equipped kitchen, showers and restrooms.
13. **Bedding** (If staying at Hamilton Valley -sleeping bag or sheet or blanket, pillow). Hamilton Valley has 10 rooms with 4 bunks each.
14. **Toiletries and Towels** (If staying at HV—Towels, toothbrush, toothpaste, shampoo, etc).

**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. For those taking the course for academic credit, a report on a two-week independent field project is required. Students will need to remain in contact with the instructor for guidance. Deadline for written reports is two weeks after the course is complete. Project grading is based on the insight and quality of work demonstrated, with some accommodation for those with limited background.

Grade Scale (based mainly on project, but weighted according to participation in class):

A = equivalent to the finest work that is expected of a student at this level

B = good work, but with a few flaws in procedure and interpretation

C = average work

D = poor work, sloppy presentation

F = no redeeming features, or failure to turn in project by deadline

**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. We will move slowly and carefully to minimize danger and impact on the cave. On the surface, especially in the National Park, it is essential to drive carefully and to obey the speed limit. Beware of snakes, ticks, chiggers, and poison ivy. Please treat your colleagues and their desire to learn with appropriate respect.

**ADA Statement:** Students with disabilities who require accommodations (academic adjustments and/or auxiliary aids or services) for this course must contact the Director of the Karst Field Studies Program, Dr. Leslie North at [leslie.north@wku.edu](mailto:leslie.north@wku.edu) or (270) 745-5982 so proper accommodations can be considered and made as necessary.

**Schedule Change Policy:** The Department of Geography and Geology 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.