

Karst Geomorphology: Field and Numerical Techniques

June 2022

Course Syllabus – For Academic Credit Participants

Course Instructor: Dr. Rachel Bosch

Instructor Email: boschr1@nku.edu

WKU Program Leader: Dr. Leslie A. North

Program Leader Email: leslie.north@wku.edu

Supplies: 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.

WKU Statement on COVID-19

All students are strongly encouraged to get the COVID-19 vaccine. Out of respect for the health and safety of the WKU community and in adherence with CDC guidelines

and practices of all public universities and colleges in Kentucky, the University requires that a cloth face covering (reusable or disposable) that covers both the nose and mouth must be worn at all times when in public areas within all buildings. Students must properly wear face coverings while in class regardless of the room size or the nature of the classroom activities. Students who fail to wear a face covering as required will be in violation of the WKU Student Code of Conduct and will be asked to comply or will face disciplinary action, including possible dismissal from the Karst Field Studies program.

In accordance with the above policy and Mammoth Cave National Park's COVID-19 safety policies, "Masks are required at all times when in public areas or shared spaces within buildings, including hallways, classrooms, laboratories, elevators, etc. Masks are also required when in a vehicle with other persons, including cars, vans, and buses, . . . as well as inside the caves and in all park buildings."

A full guide to WKU course policies can be found at <https://www.wku.edu/syllabusinfo/>.

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, we will be following best practices for gear decontamination. White-nose syndrome (WNS) has been identified in Mammoth Cave National Park. Be sure to decontaminate any clothing or gear that you bring into a cave on the field course before you travel to another caving area. WNS, caused by a fungus, is fatal to hibernating bats but does not affect humans. For details, visit <https://www.whitenosesyndrome.org/>.

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 complete the objectives in other ways or 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, e-cigarettes, vaping, or other nicotine product use 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.

Diversity and Inclusion

Diversity describes an inclusive community of people with varied human characteristics, ideas, and world views related, but not limited, to race, ethnicity, sexual orientation, gender, religion, color, creed, national origin, age, disability, socio-economic status, geographical region, or ancestry. Institutions that value diversity provide a supportive environment that respects those human differences. Western Kentucky University is committed to empowering its campus community to embrace diversity by building equitable and inclusive learning, working, and living environments. At the heart of our mission, we seek to provide holistic education and employment experiences that prepare students, faculty, and staff to become effective scholars, contributors, and leaders in our diverse and evolving communities.

Names / Pronouns

My pronouns are they/them/theirs. I will gladly honor your request to address you by a different name and/or pronouns from what is contained in your official course

registration. Please advise me of these early in the week so that I may make appropriate changes to my records.

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 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.