**Syllabus**

**EES 341 Lehigh Field Camp (6 credits)
Summer Semester 2024**

**13 May – 24 May (online)**

**28 May – 20 June (field)**

Director: Dr. Stephen Peters, Ph.D.; Department of Earth and Environmental Sciences

144 STEPS, Phone: 610-758-3660; scp2@lehigh.edu.

Instructors: Dr. Frank J. Pazzaglia, Ph.D., Dr. Stephen Peters, Ph.D.

Staff: Graduate Student Teaching Assistants

Prerequisites: Significant progress towards a Bachelors Degree in Earth and Environmental Sciences. Coursework that provides good preparation includes an introductory or gateway course to Earth and Environmental Sciences (Physical Geology, Intro to Environmental Science or equivalent), Earth Materials (Mineralogy, Petrology), Structural Geology, Sedimentology-Stratigraphy, Hydrogeology, or equivalents. Content from courses in Ecology, Biology, and Climate Sciences are discussed throughout the course.

Texts: Optional: Geological field techniques, Coe, ISBN: 978-1-4443-3062-5 Paperback 336 pages, November 2010, Wiley-Blackwell. US $59.95. We provide loaner copies in each vehicle.

Scope: Synoptic, capstone field experience for Earth and Environmental Science majors, inclusive of the field of Geology. Instruction on how to make, read, and interpret geologic maps and how to envision field problems and collect data. Focuses on making and recording field observations, discerning field relationships, and the concepts of geological mapping as a vehicle towards development of a professional earth scientist.

Format: Several multi-day, multi-partner field projects, instructed by one or more faculty, and one or more staff. Projects contain an in the field group component, and a map drafting and writing individual component.

Grading: Grades are based on the quality of projects produced during all of the exercises. Students are evaluated based on their own individual work. The breakdown is:

Cross country trip, landscape evolution, notebook, class participation (first half) 10%

Geologic mapping and Mesozoic stratigraphy (Badlands) 15%

Paleozoic stratigraphy and structure mapping (Bighorn Mtns) 20%

Volcanic rocks and active tectonics (Yellowstone), notebook, class participation (second half) 10%

Active tectonics, glacial, alluvial, and fluvial landforms, large scale temporal integration 20%

Metamorphic core complex, large scale spatial integration 15%

Tetons, wrap up ` 10%

**2024 Camp Schedule** (updated November 15, 2023)

M 13 May Welcome meeting, time TBD, **virtual only**

M 13 May through F 24 May Site familiarization, skills acquisition, draft document preparation, **virtual only**

These initial two weeks of work will generate pre-visit materials for the projects at each of the field sites. Review of the analytical approaches and develop a strategy for each project. Introduction to field tools we plan to use, develop new electronic mapping skills including how to analyze drone imagery, all of which enables efficient field time. These steps closely follow what a professional would do in preparation before visiting a field site. These weeks usually overlap with some final exams, commencement, and post-graduation celebrations. A few of the sessions will be synchronous, but most of the work will be independent and asynchronous. *Once registered for the course, these modules will be available for completion at your own pace in mid-spring. They must be completed before departure on the field portion of the camp.*

T 28 May Students arrive in person, Lehigh campus, 4pm Camp meeting

W 29 May Drive (470 mi) West from Bethlehem, PA to *East Harbor State Park*

 Pickups at:

12:00 PM Truckworld, Hubbard, OH (I-80, PA/OH State line)

or a location along I-80 in PA pre-arranged with the camp director during the registration process

R 30 May Drive (475 mi), *Camp Baraboo*
Pickup at Chicago Airport, midday, by arrangement with camp director.

 Baraboo Syncline, Great Unconformity

F 31 May Van Hise Rock, Ablemans Quarry
Drive (380 mi), *Camp Blue Mounds State Park*

 Quartzite discussion, tall grass prairie, buffalo range management

S 1 June Drive (350 mi), Arrive Badlands NP, *Camp Cedar Pass CG [2 nights]*.

*Staff to resupply food in Mitchell.*

Fossil stop in Sharps/Brule

Su 2 June Badlands – K – Cenozoic sedimentology and stratigraphy, Geologic map and cross section at Yellow Mounds focusing on topography and contacts/faults.

 Wall drug in late afternoon

 Drive back to campground (45 minutes)

M 3 June Drive to *Devils Tower* (~200 mi) via Rapid City, Scenic, S.D.

*Resupply food and laundry in Rapid City.*  Mt. Rushmore, Lead Gold Mine, Devil’s Tower NM – shallow volcanic intrusives; Ponderosa Pine forest ecosystem. Evening at Devils Tower

T 4 June Drive (180 mi) *Bighorn Mountains. [3 nights]*

Mesozoic stratigraphic section. Cross Bighorns. Alpine Doug-Fir and Sub-Alpine Fir forest.

W 5 June Sheep Mountain, field measurements, structural analysis.

R 6 June Sequence stratigraphy, add field interpretations to the stratigraphic column.

F 7 June Pinedale via Wind River Canyon, Tetons *Camp Station Creek* *[2 nights]*

S 8 June Tetons and Jackson, fault block, glacial context

Su 9 June Drive to Wildhorse, *Camp Wildhorse [7 nights]*

Craters of the Moon National Monument

M 10 June Surface processes project Day 1 – terraces and paleohydrology, remote imagery

T 11 June Surface processes project Day 2 – terraces and paleohydrology, geophysics

W 12 June Surface Processes Project Day 3 – glacial deposits; Wildhorse and Anderson Canyon.

R 13 June Surface Processes Project Day 4 – alluvial fans and fault scarp;

F 14 June Project Integration and Synthesis

S 15 June Metamorphic core complex

Su 16 June West Yellowstone (138 miles, 3.5 hours)

Setup camp at *Cabin Creek campground in afternoon [2 nights]*

East entrance of Yellowstone, to Old Faithful, Volcanic rocks at Tuff Cliffs and Firehole Canyon drive.

M 17 June Student inquiry at Yellowstone

T 18 June Driving Day 1, drop-off at Billings Airport by arrangement, flights no earlier than 1pm, Stay Sioux Falls SD hotel

W 19 June Driving Day 2, Stay Sturgis MI hotel

R 20 June Driving Day 3, Arrive Lehigh ~4pm, Students depart.