

Geoheritage & Undergraduate Education

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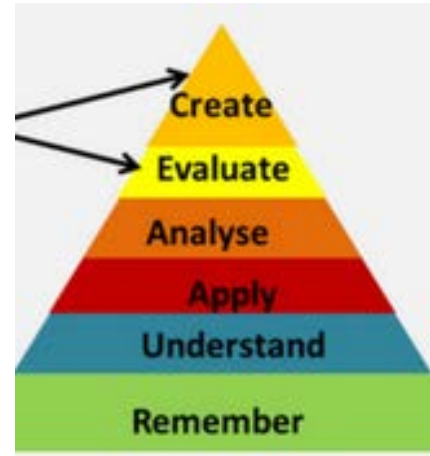
Geoscience & Undergraduate Education

- Geoheritage ought pervade the entire undergraduate geology curriculum
 - Classroom, virtual classroom, lab & field
 - Geoheritage is “Earth Systems Science”
- Go beyond “textbook examples” to exemplify synthetic education
 - Evidence-based approaches to learning
- America’s Geoheritage will gain traction if educational value is codified
 - Accessible to educators throughout formal and informal learning settings
- Codification extends to “local geoheritage.”

Geoheritage should pervade the entire undergraduate curriculum (Intro to graduate-level courses)

Geoheritage Sites are “textbook” examples but can be informed and improved by

- Scaffolding of concepts from introductory to capstone courses
- Novel assignments (portfolios, service-learning, videos, etc.)
- Universal Design for Learning (ties to diverse & extramural learners) & other evidence-based approaches to learning (NAGT, <https://theiagd.org/>; SERC, https://serc.carleton.edu/research_on_learning/synthesis/field.html etc.)
- Undergraduate student research (REUs, Inventories, etc.)
- Field experiences, both to Geoheritage sites and local geoheritage



Concept map—Geoheritage & scaffolded education & outreach

A NATIONAL CLEARINGHOUSE OF
GH SITES THAT PROVIDE A
SCAFFOLDED SET OF
INSTRUCTIONAL ACTIVITIES

Learning Goals: Undergrad--- Mapped
onto Summit of Geo Undergrad Education;
NAGT

Learning Goals: K-12, Mapped
onto NGSS, State, Local Standards

“Free Range” Learners—Citizen Science, Museum Programs,
Conservation Groups, Audubon/Sierra Club, Mineral Clubs....

Teaching Activities Developed for Each Site: Following NAGT Criteria: active learning, based on evidence-based best practices, designed for targeted audiences, universal design for access by all, recommended assessments of learning: Event 1: Intro to Site; Event 2: Geologic History; Event 3: Geologic Process; 4) Event 4: tectonics, biogeochemical cycling
Bloom Cognition: Knowledge Comprehension Application Analysis Synthesis

Teaching Activities, with all resources, information,
methods identified and ready to use; plug-n-play

Teacher Professional
Development; field
instruction

THE SCIENTIFIC FOUNDATION: Geoscience Knowledge/Data: Geologic Maps, Strat Sections, Structural Cross Sections, Landscape Photography; References to Scholarly Articles; Photomicrographs; Images, Charts, Figures....
These collections should be organic and continue to grow as new data become available

- Sites that can be visited and revisited at numerous instructional levels, providing different perspectives and experiences at every visit.
- Sites that can be shared among instructional institutions in an area
- Sites that can be shared with visiting groups—providing them with meaningful information for a successful field exercise

America's Geoheritage
is a hook at this level

Creative insights and conscious
attempts to return to GH sites

Novice

Portfolios
Low-stakes research
Service-learning
Interviews

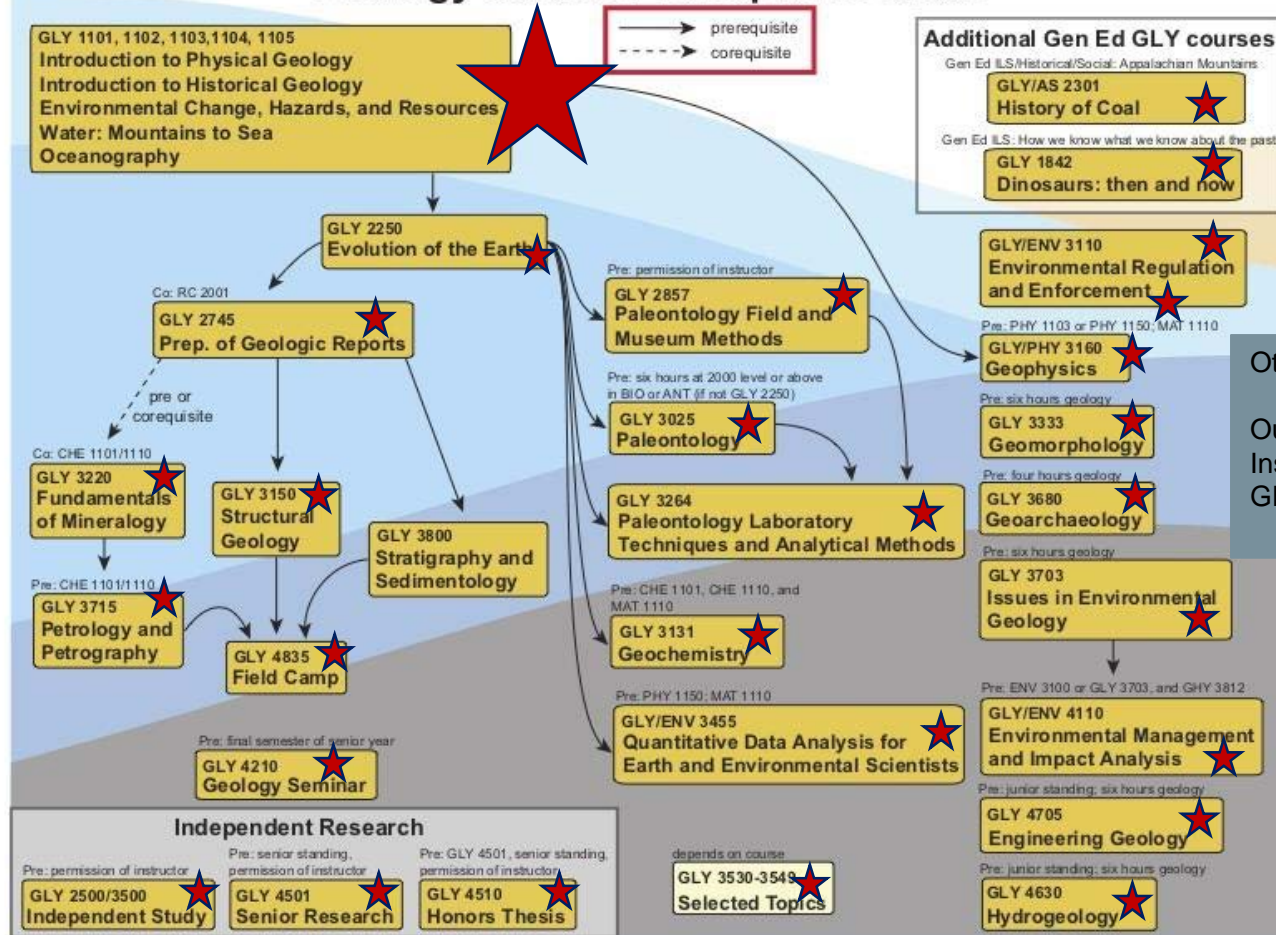
Specialized skills

Comparative
analyses
Case studies
Course projects

Capstones

Syntheses
Research/Knowledge
creation

Geology Course Prerequisite Chart



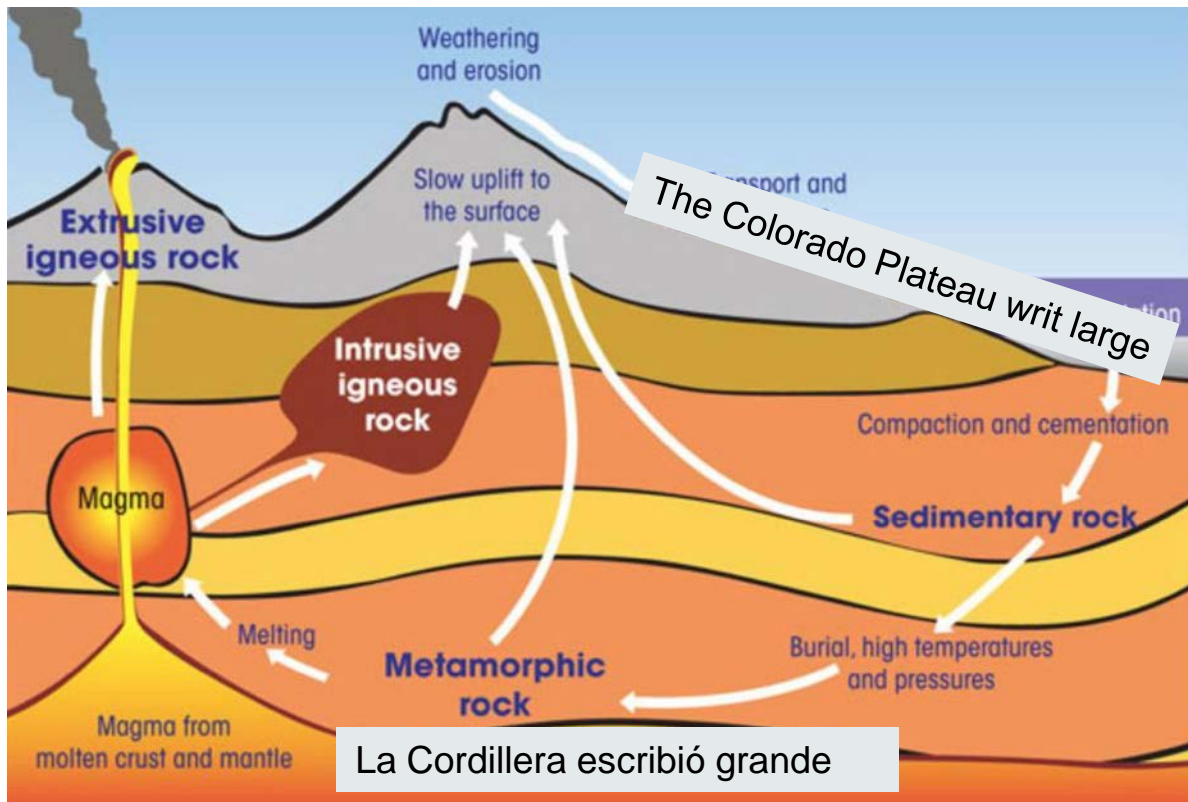
★ = courses that could tie to Geoheritage

https://earth.appstate.edu/sites/earth.appstate.edu/files/prerequisite_chart.pdf

Rock Cycle as case study/scaffolding undergraduate curricula—and why we need a Geoheritage index

Mt. St. Helens
Craters of the Moon
Hawaii, etc.

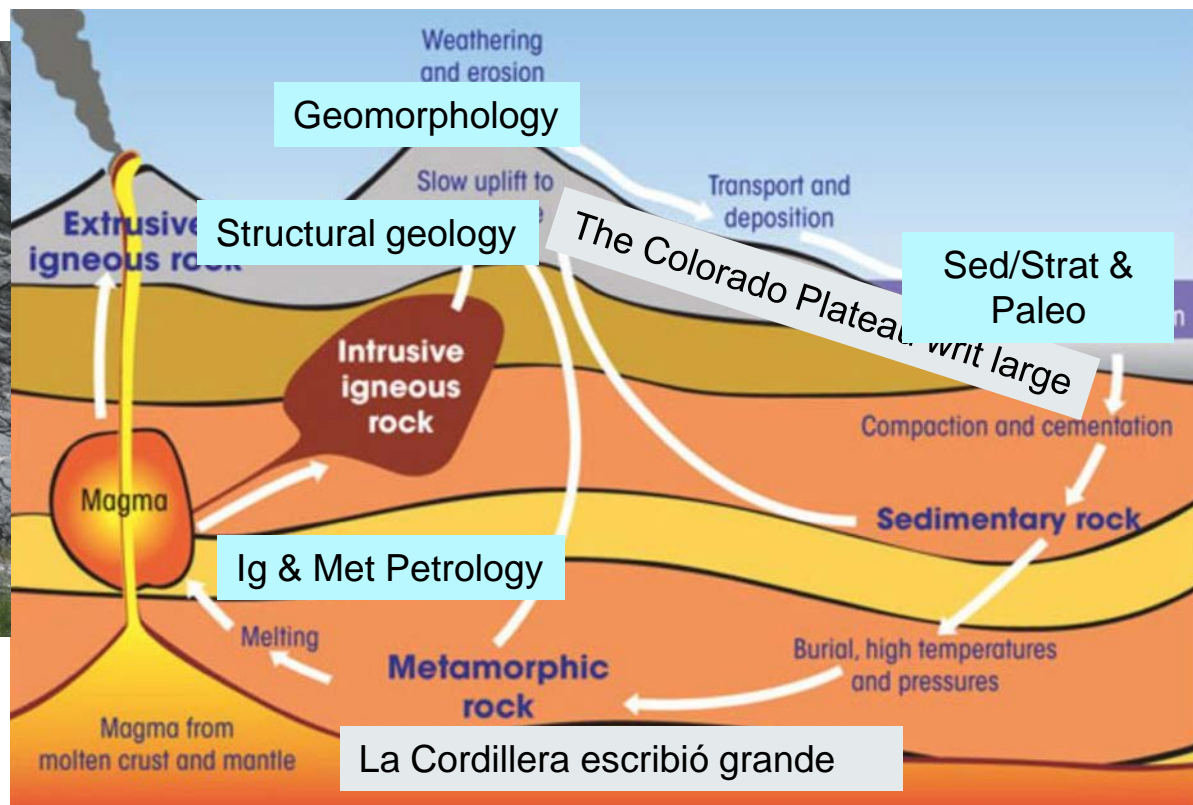
Sierra Nevada/
Yosemite
Devil's Tower etc.



Rock Cycle as case study/scaffolding undergraduate



GES 1102 Fieldtrip
ABH Photo



Geoheritage Sites vs local geoheritage

A Geoheritage Site—(inter-)nationally recognized place of geologic significance

Local sites—quarries, outcrops, field trip stops, etc.

But information could be modeled upon “Geoheritage Site” application

<https://www.nps.gov/subjects/geology/geoheritage-registry-submittal.htm>

And perhaps integrated with state interactive geologic maps



“Welcome to Boone” stop on US 421
GES 2250, fall, 2008, ABH photo

Deliberate Approach to Site Visit Planning

- What is the most useful and relevant information?
- Establish a template for educators to use and contribute
- Considerations
 - Site specifics and transportation
 - Site description and geology
 - Education goals and opportunities
 - Background and scientific resources
 - Logistics
 - Accessibility/alternative formats
- What else...?



“Triassic Trip” students, spring, 2008, ABH Photo

Example Site: Bluefield, WV

- **Location**

- 37.275332° N, 81.161854° W; NOT protected

- **Route**

- Approach from East on 52, take exit ramp to 460 Northbound
- From SB 77, take last exit before the tunnels on 52 West (John Nash Blvd), 3km on 52 to exit, stop on single-lane off-ramp
- 52 is four-lane divided highway with cross traffic (Be careful), ramp is marked by overhead signage, but not much warning for the turn

- **Access**

- Public land, WV DOT(?)
 - Contact Information (TBD)
- Parking
 - Ample parking for multiple vehicles on either side of the exit ramp
 - Shoulder is very wide and gently sloped; parking on left is probably best to be able to see approaching vehicles when departing
 - One-way ingress/egress, no turning around necessary

- **Site description**

- Large, well-exposed outcrops on north/east side of ramp and west/south side
 - Slopes are steep, but there is one terrace about 8 ft above road grade
 - Abandoned cloverleaf allows for walking/exploring the area south/west of the ramp
 - Distinctive fault contact; some gradational, some distinct formation contacts; correlation across the road
- Appropriate tools
 - Collecting is allowed, but recommended restricting to float
 - Dipping stratigraphy, limestones and shales; Bruntons, hammers, acid
- Rock'd Information
 - Middle and Upper Devonian, includes Marcellus outcrop north of the ramp
 - Unconformity between M Dev and Lower Ordovician Beekmantown
 - St. Paul group is the southernmost exposed at this site
- Research (journal articles, etc.)
 - LOTS available!



Google Earth® image captured by K. Fredrick

Continued...

- **Course applications**
 - Intro all the way to Upper-level field methods and structure; hydro and geomorphology are weak at the site, but the region is Valley and Ridge
 - Prerequisite materials
 - Geologic map
 - Stratigraphic column
 - Potential activities
 - Mapping, sketching, site/rock descriptions and note-taking
- **Non-geological considerations**
 - Geoethics
 - Environmental impacts/legacy
 - History
 - Resource extraction
- **Logistical considerations**
 - Nearest Health and Safety resources
 - Restrooms, nearby food
 - Nearest towns (hotels? camping?)
 - Cell signal
- **Accessibility**
 - ADA?
 - Virtual field trip?



Google Maps Streetview® image captured by K. Fredrick

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