


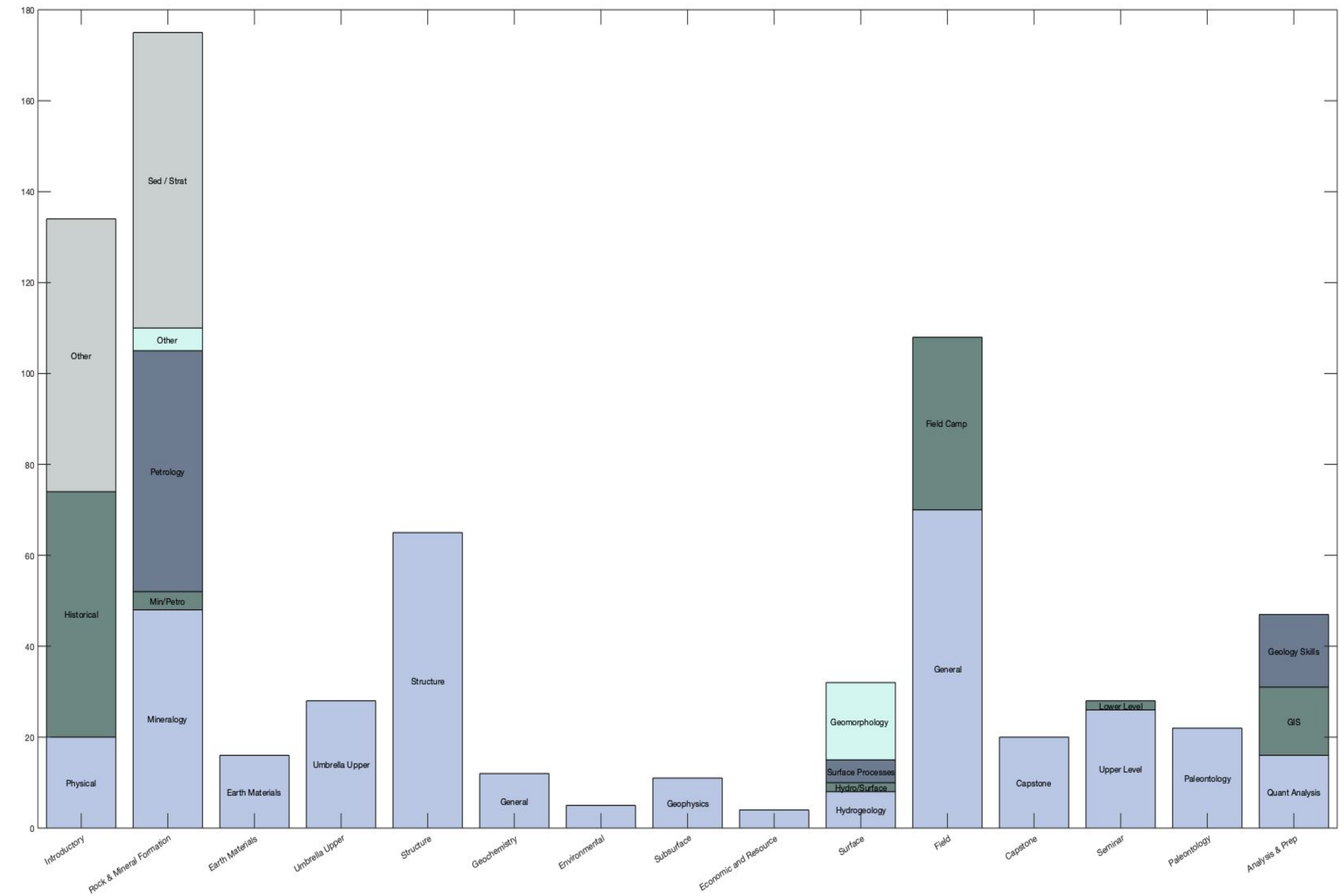
# So what does a degree in geology actually mean? An analysis of commonly required courses

Annie Klyce, Katherine Ryker - School of Earth Ocean and Environment - University of South Carolina

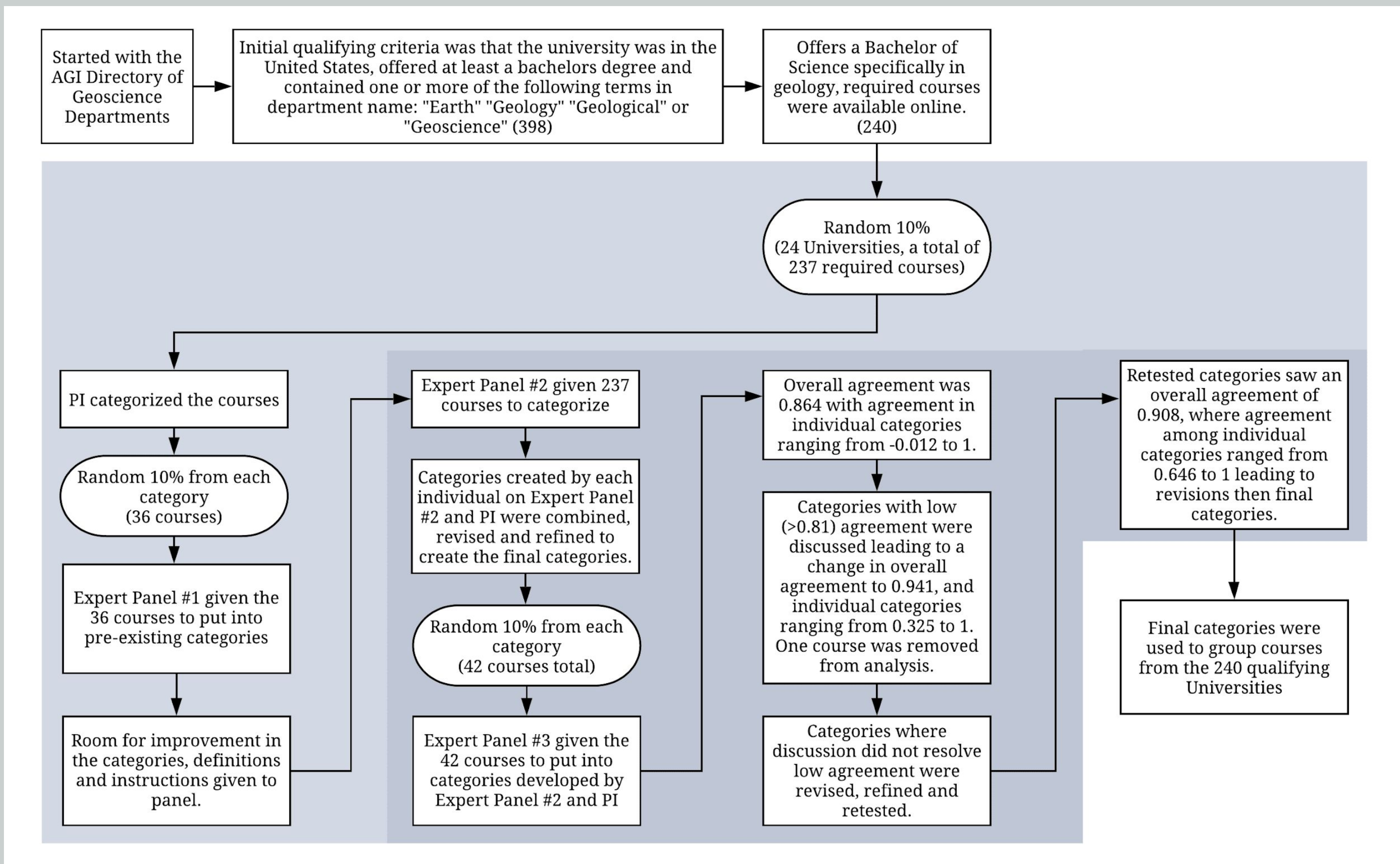
 aklyce@seoe.sc.edu, kryker@seoe.sc.edu



School of the  
**Earth, Ocean  
and Environment**



## Methods

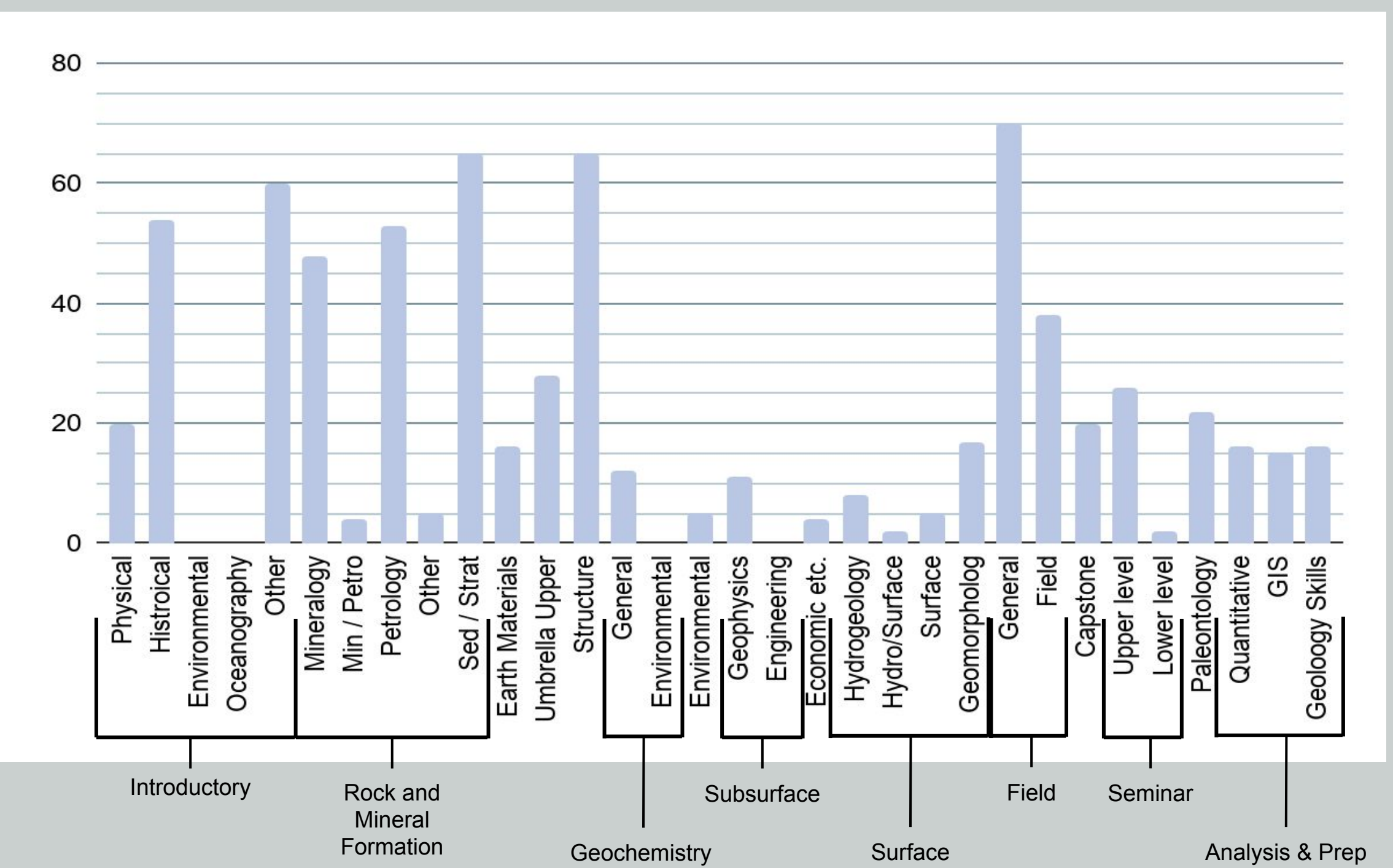


## Figure Descriptions

*Preliminary Sample Size = 64 Universities. Courses in this study were required major courses within the department.*

Figure 1 (left): Frequency chart of courses within super-categories, which are represented by each bar and labeled on the horizontal axis, and sub-categories which are color separated and individually labeled whenever their value is greater than zero.

Figure 2 (below): Frequency chart of courses separated by sub-category, with highlights below showing the super-categories.



## Discussion & Future Work

In terms of the classes that are required of geology majors, there is no prescribed uniformity throughout programs across the country. Because of this, we tend to rely on folk understandings of what courses should be required of our majors. Understanding what we expect from our majors is the first step toward preparing them as best we can for future learning (e.g., field camp), the workforce and/or graduate school.

Preliminary trends indicate an emphasis (sum of points in category / number of universities analyzed >90%) on field experiences and structural, sedimentary and introductory geology courses. Other courses with significant (70-89%) frequency are mineralogy, petrology and historical geology.

Next steps are analyzing required courses from remaining 170 universities, review courses that caused disagreement in the binning process with an expert panel, conduct an intra-rater reliability analysis and publish findings.

Future work should characterize the courses deemed “electives” (i.e., the university instructed students to take an additional four geology courses from a list of 20) to determine any trends.

## Code Book

### Introductory

- Physical: Course name implies that it focuses on physical geology
- Historical/Through Time: Course name implies historical geology; earth through time, evolution of earth. Should not be mistaken for paleontology, geomorphology or environmental geology
- Environmental: Courses that deal with the interaction of environmental problems and geology at an introductory level
- Oceanography: Course name implies a focus in the ocean
- Umbrella Lower: Any courses that do not neatly fit into another bin that are 200/2000 level or lower (freshman/sophomore) or that fall into multiple categories, making it difficult to decide on one in particular. Or introductory courses without a focus

### Rock and Mineral Formation

- Mineralogy: Courses that focus on mineral structure, atomic arrangement, crystal structures, etc. (including optical techniques)
- Combination Mineralogy/Petrology: Combines both mineralogy and petrology into one course
- Petrology: Courses that focus upon the origin and mineral assemblage of rocks (all types). Optical courses included if directly tied to petrology (otherwise in Mineralogy)
- Other: Classes that definitely meet the criteria of “rock forming” but cannot be neatly put into the other subcategories. This can be due to a combination of rock forming classes other than mineralogy/petrology
- Sedimentology and Stratigraphy: Courses that focus upon the formation and/or layering of sedimentary rocks

### Earth Materials

- Earth Materials: Courses titled “Earth Materials” regardless of course level
- Umbrella Upper: Any courses that do not neatly fit into another bin that are 300/3000 level or higher (junior/senior). Also for courses that fell into two different greater categories. For example, sedimentary basin analysis could combine rock/mineral forming and structure, and geophysics

### Structure

- Structure: Courses that focus upon the behavior of rocks under stress, their associated landforms and kinematics (including tectonics)

### Geochemistry

- General: The study of chemistry as it relates to geologic materials and processes
- Environmental: The same as general geochemistry, but with a specified focus in “environment”
- Environmental Geology: Upper level courses (300/3000 or above) that deal with problems and interactions of geology and the environment

### Subsurface Systems

- Geophysics: The study of the internal structure and behavior of the interior of the solid earth. Typically, explicitly states “geophysics”
- Engineering: Courses directed towards engineering or the mechanics of earth

### Economic and Resource Geology

- Resources: These courses are ones that deal specifically with one or more of Earth’s natural resources (e.g. mineral, water, energy), also encompasses economic geology

### Surface Systems

- Hydrogeology: Courses that focus upon water and the earth system. All hydro-related courses were put here unless related to sedimentary rocks (sedimentology) or water as a change agent for landforms (geomorphology)
- Combined: Combines other courses within the “surface systems” header into one class. E.g., Hydrology and Geomorphology
- Surface processes: The same as geomorphology, but the course title is explicitly “surface processes” or “surface evolution” or “surface development”
- Geomorphology: Courses that focus on geomorphology and associated landforms

### Field Courses

- General Field Course: These all focus on the fundamentals of field geology and the techniques used to conduct fieldwork. These include all courses that do not appear to be the capstone course, “field camp”
- Field Camp/capstone field course: Listed as/is clearly either “field camp”, “capstone” or consisting of more than the normal course load worth of credit hours (usually ~5-6) and is typically taught over the summer
- Capstone
- General Capstone: A capstone course that leads to the completion of a project, such as a thesis. Also includes courses that are a step toward completing a thesis/project (e.g., project completion offered at a university that later leads to a capstone experience)

### Seminar

- Upper Level Seminar: Upper level (300/3000 or higher) seminar, “senior seminar” or upper level discussion course
- Lower Level Seminar: Lower level (200/2000 or lower) seminar or discussion course)
- Paleontology
- Paleontology: These courses investigate organisms and their record in earth’s history. Distinct from earth history (historical geology) by its emphasis on the study of life

### Analysis and Preparation

- Quantitative analysis / Data analysis: These are all upper level courses that focus on analyzing data quantitatively.
- GIS: Courses that require GIS or computational analyses, all of these courses have an emphasis on geospatial techniques
- Geology Skill Prep: These are courses that are geared toward teaching students geo skills or tools that they may use while studying or working in the geosciences. Can include communication, presentations, grant writing, etc.

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