WHAT EMPLOYERS WANT....

A Geoscience Employers Workshop was held May 27-28, 2017 in Washington D.C. to get input on the developing community vision for the geosciences. The 46 participants included an even distribution of employers from the petroleum industries; hydrology, engineering and environmental consulting companies; and federal agencies that employ geoscientists, along with representatives from some of the geoscience professional societies. One participant represented the mining.

The first breakout session asked them to identify the skills competencies and conceptual understandings needed by undergraduates for future employment. Subsequently the results from the Summit and survey were presented, and several breakout sessions focused on comparison of their initial views and that of the Summit and survey.

Overall there was strong agreement amongst the employers, with little variation based on type of employer, and strong agreement with the developing vision from the Summit and survey. In addition to their own views, they also provided needed granularity to the concepts and skills identified by the Summit.

Lastly, they discussed ways to implement or develop these skills and competencies in students, the role industry and other employers should take to help the academic community, and how to develop better academic-industry partnerships.

These are the most sought-after applicant skills that were identified by the workshop participants:

- PROFICIENCY in critical thinking/problem solving skills.
- PROFICIENCY in communicating effectively to scientists & non-scientists.
- MASTERY of solving problems, especially those requiring spatial and temporal (i.e. 3D and 4D) interpretations.
- MASTERY of making inferences about the Earth system from observations of the natural world combined with experimentation and modeling.
- MASTERY of working with uncertainty, non-uniqueness, incompleteness, ambiguity and indirect observations.
- MASTERY of the ability to access and integrate information from different sources and to continue to learn.
- PROFICIENCY in understanding and using scientific research methods.
- PROFICIENCY in quantitative skills and the ability to apply them.
- PROFICIENCY in integrating data from different disciplines and applying systems thinking.

- PROFICIENCY IN AND MASTERY OF strong field skills and a working knowledge of GIS.
- PROFICIENCY in working in interdisciplinary teams and across cultures.
- PROFICIENCY in computational skills and the ability to manage and analyze large datasets.
- MASTERY of technology and versatility in its use (i.e. Google Earth, tablets, smartphones, apps).

CAREER PREPARATION: G429, *Field Geology in the Rocky Mountains*

G429 is designed to help students:

A. Build fundamental geologic skills:
   i. Rock description and geologic formation recognition;
   ii. Identification of what is normal and what is anomalous;
   iii. Stratigraphic interpretation (depositional processes, facies, environments, etc.);
   iv. Bedrock mapping;
   v. Cross-section and block-diagram construction;
   vi. Structural description and analysis;
   vii. Interpreting basic petrologic and geochemical data;
   viii. Describing geologic history;
   ix. Geologic note taking;
   x. Writing a technical report.

B. Integrate different geoscience sub-disciplines to describe complex geology and interpret the processes that created it.

C. Think in 3-dimensions – how geology exposed at the Earth's surface translates into the 3-D geologic architecture that exists in the subsurface and has been removed by erosion.

D. Think in 4-dimensions – what changes happened through geologic time to create the geology we see today:
   i. What were the paleogeography and facies distributions that existed when each of the sedimentary rocks were deposited?
   ii. What diagenetic and/or metamorphic processes have changed the rocks?
   iii. What are the depth, pressure and temperature implications of metamorphic and igneous events?
   iv. How much time is missing on unconformities and what are the implications of that missing time?

v. Was the structure created by a single deformational event or by multiple events? If multiple events, can we separate what happened when?

vi. Were deposition, deformation, metamorphism and/or igneous activity interrelated? If they were, how?

E. Take a deeper dive into a sub-discipline of their choosing:

i. Environmental geology and hydrology

ii. Geophysics;

iii. Igneous rocks and processes;

iv. Sedimentology and stratigraphy.

F. Build decision making skills and confidence:

i. How to use the scientific method;

ii. How to u+se and test multiple working hypotheses;

iii. How to document and use fundamentally sound assumptions in the face of ambiguity.

G. Build project management skills – how to address objectives and meet deadlines.

Grading is weighted heavily toward projects near the end of the course so that the final grade reflects the student's skills and competencies after they are fully developed and honed.