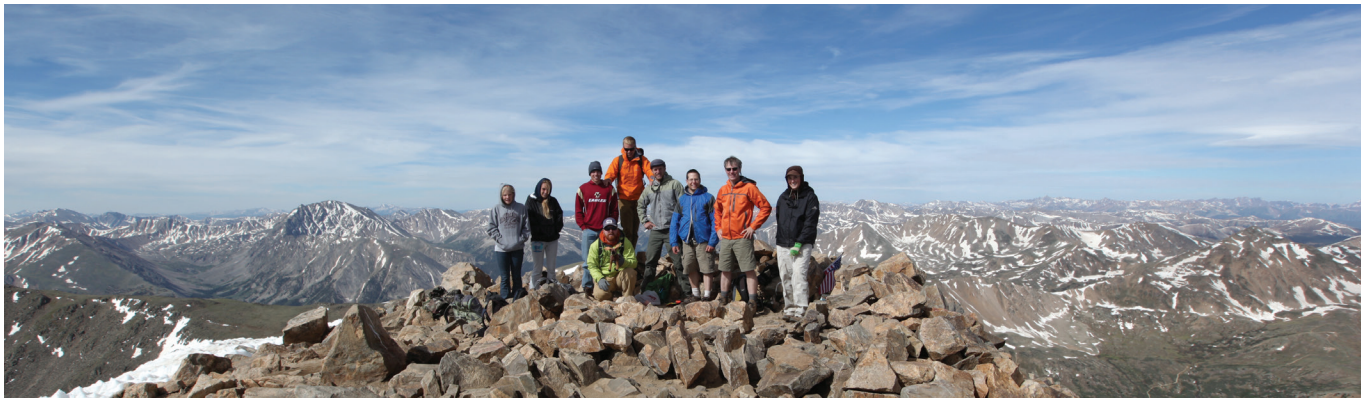
Faculty: Beyond the Classroom

Field Science Provides
Unique Learning Experience for Geoscience Students



Concord students and faculty on the summit of Mt. Elbert, Colo., in June, 2013. At an elevation of 14,439 ft, it is the second highest mountain in the contiguous United States and the highest in the Rocky Mountains.Pictured are (L to R): Donnie Kirk, Joanna Kimmel, Caleb Harrison, Jason Holley, Ryan Baisden, Luke Stevens, and faculty members Dr. Steve Kuehn (Assistant Professor of Geology), Dr. Joseph Allen (Professor of Geology and Chairman of the Division of Science, Mathematics, & Health), and Ms. Eva Lyon (Lecturer in Geology).

Photograph by Sheena Grabski of Sheena Harper Photography

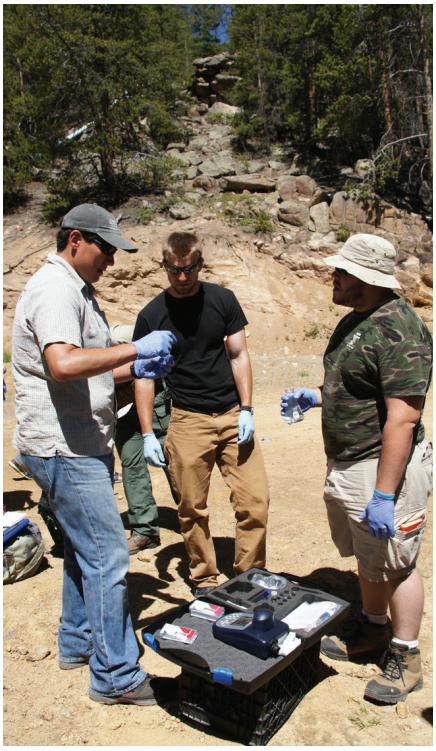
During May and June 2013, 19 environmental geoscience students travelled to Utah and Colorado to participate in Concord's five-week summer geology field camp. Each summer, more than 2000 undergraduate students from universities around the country participate in geology field camps as a culminating experience in their education. Concord's six-credit course is offered every other year, and this year we had more student participants than many large state universities throughout the country – even some research institutions with very well known geoscience programs.

Geology field camps are a unique experience in higher education. They require students to live and work together for an extended period of time while tackling complex, real-world problems. In essence, the course is an immersive exercise in problem solving that integrates all of their classroom learning. Most importantly, it teaches students to ask the right questions, while fostering team building and collaboration. All of these skills are highly sought after in the workplace, and the students gain them by creating and interpreting geologic maps.

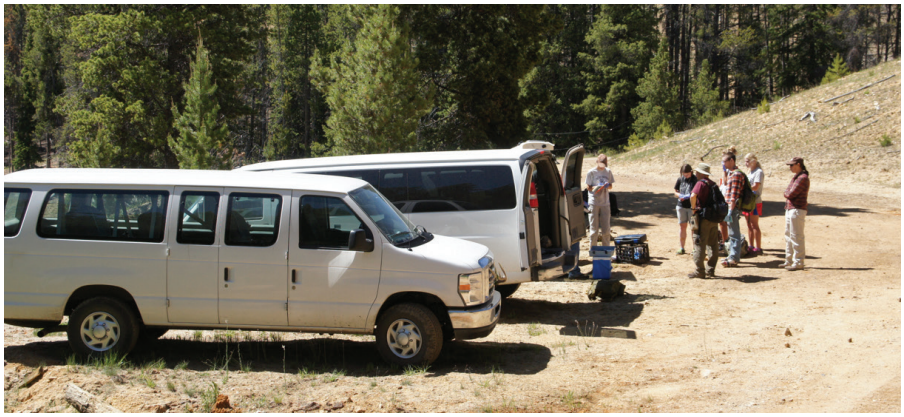
Geologic maps are created in order to make sense of the seemingly chaotic distribution of materials that can be found at Earth's surface. The maps show the distribution and age of an enormous variety of rocks and unconsolidated sediments present at Earth's surface, and allow scientists to accurately predict their distribution thousands of feet underground. Creating such maps is an extremely challenging technical task that requires knowledge of complex geologic processes, and utilizes spatial reasoning skills including the mathematics of trigonometry and geometry.

After geologic maps are created, they provide many benefits to society. Historically, they were created to aid exploration for strategic ore metals and energy resources such as coal, petroleum, and uranium, especially during

World War II and the ensuing Cold War in the 20th century. Since then, uses have greatly expanded and include: (i) delineation of biological habitats and ecosystems; (ii) watershed protection; (iii) assessment of susceptibility to natural hazards including floods, wildfires, and extreme weather events; (iv) development of water and soil resources; (v) assessment of climate change impacts; and



Water Sampling: CU students analyze the chemistry of acid mine drainage in the field. In collaboration with Professor Kato Dee of Colorado Mountain College (CMC), students learned about modern remediation strategies for abandoned mine lands. L to R: Donnie Kirk, Kato Dee (CMC), Luke Stevens, Al McCreary.



Students prepare for a day in the field near Leadville, Colo.

(vi) land-use planning, including transportation networks, engineering and construction, and the development of wind, solar, and conventional power plants.

Learning to make geologic maps builds fundamental field skills that are critical for career development. Although many professional geoscientists devote extensive time to office work utilizing computer models, or perhaps even programming them, the data are ultimately derived from the field. As a practical example from the energy industry, professional geoscientists are challenged to determine exactly where fossil fuels can be located thousands of feet underground. Since an individual exploration and development project can cost millions or even hundreds of millions of dollars, it is critical to get it right. In the environmental industry, geoscientists are often asked to predict how and where toxic contaminants are likely to migrate through groundwater and surface waters over time. In both examples, scientific predictions must be based upon both classroom knowledge and practical wisdom gained in the field in order to reflect reality.

Like most geology field camps, Concord operates a course in the western United States. Most universities do so because a diverse range of geologic environments can be accessed in close proximity to one another, and because the arid climate preserves rock and sediment in a pristine state at the surface, which helps students to learn. Concord alumni have an advantage over graduates from many other universities because our students

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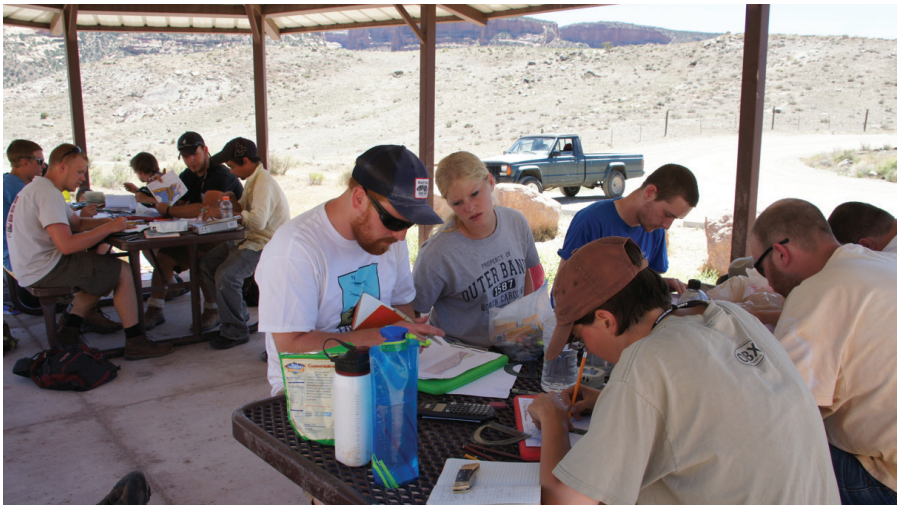


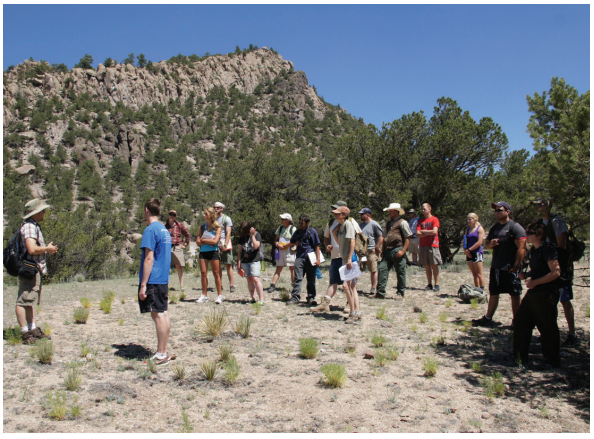
Students compile geologic maps in the shade following a two-day mapping exercise in the desert heat of Colorado National Monument. During the trip, students camped in tents at several locations throughout Colorado and Utah, and stayed in residence halls at Western State Colorado University in Gunnison, and Colorado Mountain College in Leadville.

also gain early field experience in the Appalachians during afternoon field exercises near campus and extended weekend field trips during the regular academic year.

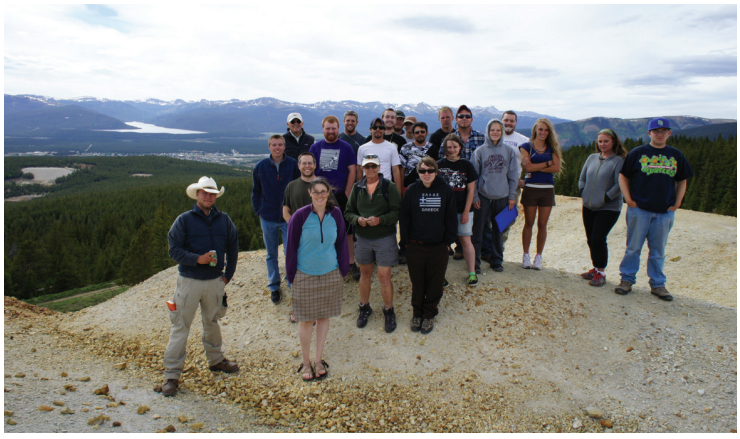
For many students, the cross-country van ride for field camp is their first trip away from West Virginia and the immediate vicinity. However, participating in the course is a major commitment for students in terms of time, money, and family obligations. Not only must they pay additional tuition for a summer class, they also must save to pay for their room and board while travelling and give up potential income from summer jobs; students with families may have additional expenses for child care while away. After completing college and entering the workforce, published studies show that geoscientists reflect upon their field camp experience and the collegiality that develops from it as a seminal moment in their development as both a scientist and a person.

Field camp also introduces students to the wide range of geologic environments they are likely to encounter during their career. Although most Concord geoscience alumni are living and working in West Virginia or the nearby Appalachian region, their jobs frequently demand that they travel or work with data from elsewhere in the world. In their careers, our alumni have worked on projects in Europe, the Middle East, Alaska, California, the Gulf and Atlantic coasts, the Rocky Mountains, the Appalachians, and elsewhere throughout North America.

As noted by the American Geosciences Institute (AGI), society is facing more issues and challenges that require application of geologic skills than ever before. The U.S. Bureau of Labor Statistics and AGI predict that the United States will require at least 95,000 more geoscientists by 2018. Given that there are fewer than 2000 new graduates entering the workforce annually, well-qualified geoscientists face a remarkably strong job market. Industry geologists are always surprised and impressed that we operate our own camp and intimately tie it to our specific, environmentally based curriculum. Concord's field camp adds a sense of legitimacy to our environmental geoscience degree, and the success of Concord alumni in the job market can be largely attributed to the field camp experience.



Following a three-day mapping exercise at Ruby Mountain, Colo., Dr. Steve Kuehn (left), Concord assistant professor of geology, explains how volcanic ash and violent mudflows are formed and deposited.



Group photograph at an abandoned mine site above Leadville, Colo. Greg Allen '70 (back row, left), current Vice Chair of the Concord University Board of Governors, resides in Arizona and joined the class for a field trip.