



Chemistry: An interdisciplinary course tying together geology, physics, and chemistry through discovery and active learning exercises

A course entitled "Our Microscopic Universe" by Susan A. Jansen, Temple University Department of Chemistry (1997)

Course Design:

The course is designed to illustrate classic theories of geology, physics, and chemistry through activities rooted in discovery and active learning. "Our Microscopic Universe" is designed for non-chemistry majors and in particular for elementary education majors due to the emphasis on instructional techniques. The focus of the course is local geology, which involves an understanding of rock formation and composition, of environmental damage caused by quarrying rock, of crystal structure and molecular size, and of kinetic energy and temperature. Geology, physics, and chemistry faculty team-teach the course. Field trips to gather samples or to compare observations to topographical maps are paired with laboratory work on mineral analysis, density determination, and atomic spectroscopy. In each unit, the sequence begins with student field-work, is followed by brief classroom explanations, is confirmed by laboratory work, and concludes with class discussions.

Higher Level Learning:

Students gain a basic understanding of how to apply fundamental principles in geology, physics, and chemistry to their local environment (**Acting**). Instead of covering the concepts in isolation, the course introduces the necessary concepts from each discipline as needed for a cohesive understanding of the necessary interplay between the sciences (**Connecting**). By tracing the links between scientific disciplines, the course is able to give students a better understanding of the critical thinking strategies and modes of inquiry necessary for strong scientific analysis and reasoning (**Learning**).

Active Learning:

The course is based on the premise that students learn more through active engagement with the material; as a result, student fieldwork, student laboratory analysis, and class discussions form the core of the course (**Doing**). Students also benefit from the teaching team modeling the thought processes required of scientific disciplines (**Observing**). Students work together in laboratory work and, along with the faculty from each of the three disciplines, participate in frequent class discussions (**Dialogue with Others**).

Jansen, S. A. (1997). Our Microscopic Universe. *Journal of Chemical Education*, 74 (12) pp. 1411-1412.