

## Introductory Geology at Bergen Community College

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PHY-113 Geology is a general-education course at Bergen Community College. As BCC does not have a geology or Earth sciences major, nor even an advanced geology course, its main purpose is to help students fulfill their two-course general-educational requirement in the natural sciences. Most students who take it are not STEM majors; it is not a required course for them and most will use other courses for their electives. Even so, we do get the occasional student who wants to study geology coming in to BCC or likes the subject so much that they decide to study it when they transfer to a four-year school. For these students, I try to give as rigorous, comprehensive introduction as I can, without losing the vast majority of the rest of my students. For them, my goals are two-fold: introduce them to the beauty and wonder of geology and give them a good grounding in how to understand science.

These are straight-forward but challenging. Often my students have poor math skills and are self-confessed matho- and sciencephobes. Some take the course because they think it may be interesting (or heard from a friend that it is) and some take it because they need the course and it works with their schedule. But no matter what their reasons for choosing it, I strive make the course both informative and enjoyable, to show them that they can understand and appreciate science, and that it's not as difficult as they think it is.

To this end, I have been making my courses more student-centered, using in-class group exercises and worksheets to introduce many topics. I want the students to use these exercises as a way of teaching themselves and therefore they are not asked to answer questions on topics that we have already spent time on (unless they have actually done the assigned reading). Instead, I use explore-then-learn activities where they are presented with simplified scenarios or analogies that they can figure out by themselves and then I go on to explain and we investigate how they are analogous to the topic of interest.

To ascertain if students are understanding these concepts, they are given exam questions that address broad concepts, not just specific details. They are asked to explain scenarios and figures similar to the ones they were given in the explore-then-learn exercises. I am looking to see if they have a basic understanding of the concepts, for example, as how a tectonic plate is moving given some data such as the ages of some seamounts. They are also given essay questions where they are asked to give a demonstration of their understanding of scientific ideas in their own words. How is plate tectonics a unifying theory in geology? What is meant by the texture of an igneous rock and what factors control it? I am not looking for specific vocabulary; if they know the terms fine, but anyone can memorize the word phaneritic without knowing what it means. And even if they know what it means, if they're explaining it to someone else, that person won't know what it means. I try to get them to explain things to me as if they were explaining them to a friend, perhaps if they came across something on a leisurely walk in the woods. If they are confident and knowledgeable, it will show and I'll know that they have the understanding that I was striving for.