

"SEEING THROUGH SYMMETRY" — A MULTIMEDIA COURSE*

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A recent NSF Instrumentation and Laboratory Improvement grant (No. DUE-9352670) enables us to provide a state-of-the-art interactive multimedia authoring platform (directed by Buckley, co-PI) for the enhancement of an interdisciplinary course, "Seeing Through Symmetry" (created by Gould, Project Director) that is for non-science majors and is focused around the concept of symmetry. That concept is used both as a link between subjects (such as physics, mathematics, music, and poetry) and as a method within a subject. Computer-based labs enable the student to further explore the concept by being gently led from the arts to mathematics and science. An explanation is given on how a variety of multimedia tools contribute to both the lecture and lab portion of the course. The aims of the course are as follows:

Symmetry is utilized as a basic concept through which many aspects of the scientific and artistic worlds can be better understood and appreciated. The course begins by illustrating pleasing patterns in the sciences and in the arts; this leads us to formulate a general definition of symmetry. We then characterize symmetry using elementary mathematical notions. Next we go on to see examples of symmetry in art, in poetry, and in music. Finally, we display the existence of symmetry in physics, chemistry, biology, and cosmology. A brief excursion into asymmetry ends the course.

Students will be able to explicitly develop their quantitative abilities and analogical thinking by using concepts of symmetry both as a method within a discipline and as a bridge between disciplines. They develop these abilities, in part, through the medium of a highly

graphical laboratory experience; this utilizes computers in order for them to explore the many scientific facets of symmetry (in such areas as geometry, the arts, music, and physics) and to generate their own patterns through the use of software packages and programming. In a maximum of 12 labs, each meeting once a week, discussion is encouraged between the students in order to promote a collaborative atmosphere for scientific investigation.