Science Area Course: Courses for Non-science majors

The natural sciences are part of the core of a liberal arts and sciences education and, in particular, a liberally educated individual should be scientifically literate. In a paper given by Chemist Michael P. Doyle, formerly of Research Corporation, he claimed that

> *All students, science and non-science majors alike, must be in position to make critical decisions regarding healthcare, the environment, technology, and other prominent issues. In order for them to make informed decisions, they must be scientifically literate, meaning that they must possess a minimal understanding of terms and concepts, scientific processes, and the impact of science on society....*

("Challenges of the Futures of Liberal Arts Colleges: Asking the Right Questions," *Occasional Paper II: What Works, 1994,* http://www.pkal.org/documents/ChallengesOfTheFutureOfLiberalArts.cfm accessed on 1/26/07)
Doyle's paper grew out of a Project Kaleidoscope symposium on science and the liberal arts. Project Kaleidoscope, a leader in this field, has since worked to identify features of a general education curriculum focused on scientific and quantitative literacy. These features include a curriculum that:

- *reflects a common understanding of what "literacy" is (scientific/quantitative) and has means in place to measure student progress toward such literacy (literacy: an appreciation of the relevance of math and science to the past, present and future of our global community; an understanding of and comfort with the use of the methods of science and math; the ability to make use of various modes of quantitative and scientific ways of thinking in solving real-world problems)*
- *reinforces insights into how people learn, leading students to be able to organize and apply knowledge, as well as the value of experiential learning and of giving students responsibility to learn for themselves*
- *connects students with opportunity to confront and address real-world problems*
- *brings science at the cutting-edge into programs addressing scientific and quantitative literacy.*

(*Project Kaleidoscope: What Works Volume IV:* "Shaping General Education Program Focused on Scientific and Quantitative Literacy" http://www.pkal.org/documents/WhatWorksLiteracy.cfm accessed on 1/26/07)

Components of an N-Area Course for Non-Science Majors:
Drawing on these descriptions of scientific literacy in the context of the goals for Eckerd's general education, then, science area courses for non-science majors should include the following components:

1. an introduction to the methods of scientific analysis and problem-solving including quantitative analysis in understanding and interpreting data, scientific methodology, the interplay between theory and experiment and the role of scientific theories.
2. an experiential component (lab work and/or field-work)

and ideally, such courses will also

3. be interdisciplinary
4. include a discussion of values around the uses of science

Proposal for N-area courses:
We propose that the "N" area course requirement for non-science majors be met in two ways: 1) A new team taught course in the Natural Sciences, or 2) the current N-Area courses that either already include an experiential component or are modified to include an experiential component.

Example New Interdisciplinary/Team Taught Course: Global Warming
As an example, consider a course on “Global Warming” team-taught by 3-4 faculty from across the Natural Sciences (initial idea from a proposal for a Science Forum suggested in a memo to the GE Review Committee from Bill Roess, Professor Emeritus of Biology). Each faculty member would have his/her own section of the course, lead discussions in that section, and be the laboratory instructor for that section. The multiple sections would meet together as a whole for plenary-style lectures as appropriate for different sections of the course: a chemist explains the chemistry of greenhouse gases, a physicist explains relevant thermodynamics including heat, entropy, absorption/emission spectra, a mathematician/computer scientist explains mathematical modeling, a biologist explains photosynthesis and its role in global gases, etc. These plenary-style lectures would be followed by individual course discussion sections and relevant laboratory/field work (possibly using current laboratory space in the mornings or over WT).

Other potential topics include (again from ideas for a Science Forum from Bill Roess):
- Genetic engineering and Genomics (health, agriculture, & industrial enzymes)
- Alternative Fuels/ could be part of global warming
- Ecological / environmental health

Resource Implications:
Staffing: In AY 06-07, 106 students were enrolled in 5 courses designed as N-area perspectives for non-science majors. If all of these students went into a course with a laboratory component, instead of 5 courses for faculty, this would require 7 courses [assuming 1 course in WT and then 4 faculty*1.5 courses = 6 faculty courses (faculty teaching a course and the associated lab get credit for 1.5 courses)]. From the AY 06-07 staffing (an adjunct and CPT teaching 3 of these 5 courses), this means an additional 5 courses or 4 courses plus an overload.
Faculty increase: 4/7 to 5/7 faculty line per year

Faculty Development: Faculty need release time to develop a new interdisciplinary course as described above. A core of 2-3 faculty should get a ½ course release each (or overload pay) to develop such a course.
Cost: 3*overload pay every 4 years (to develop new courses)

Facilities: Use of laboratories in the morning (when not in use), WT and in new science building. **No additional facilities needed.**

Equipment: Purchase of laboratory equipment (supplies) for 100 students at a time to do an experiment.
Cost: $1000/student (??) to purchase everything up front = $100,000 one-time cost (future costs for consumables supported by a nominal laboratory fee).