

**2006-07 ACADEMIC SENATE REVIEW OF THE
SCIENTIFIC INQUIRY GENERAL EDUCATION FOUNDATION AREA**

Internal Reviewer:

Lowell Gallagher, Undergraduate Council, English, Review Team Chair

External Reviewer:

Thomas J. Carew, Neurobiology and Behavior, University of California, Irvine

Date of Site Visit: May 29, 2007

Date of Report: July 11, 2007

Approved by the Undergraduate Council:

Approved by the Graduate Council:

Appendix I: Site Visit Schedule

Appendix II: External Reviewer Report

Appendix III: Self-Review Report

Academic Program Review
General Education Foundation Area: Scientific Inquiry
May 29, 2007

Introduction

Following the recommendations of the 1997 UCLA faculty-student report on the General Education curriculum and the initiatives of Vice Provost Judith L. Smith and the Undergraduate Council, the General Education Governance Committee was instituted in 1998-99 to oversee the creation of campus-wide General Education (GE) curricula and course lists in three foundational areas: Arts and Humanities, Society and Culture, and Scientific Inquiry. The foundation framework and common course list were adopted by the College in 2002 and the professional schools with undergraduate programs in 2004 and 2005. As of Fall 2006, all incoming UCLA freshmen satisfy their GE requirements by taking a requisite number of courses across three foundation areas of knowledge. With the institution of this common GE curriculum, all courses carrying GE credit, old and new, have been reviewed by the GE Governance Committee, its ad hoc workgroups, and the Undergraduate Council according to the criteria set forth in the mission statements and course guidelines developed by UCLA faculty for the different foundation areas. The site visit of the GE foundation in Scientific Inquiry, which took place May 29, 2007, is the first external review of the revised GE curriculum. Reviews of the other two foundational areas (Society and Culture and Arts and Humanities) are slated for 2007-08 and 2008-09 respectively. The charge of the site visit was twofold: 1) to determine whether the SI curriculum, in practice, is consistent with the specific disciplinary expectations described in the 2002 SI mission statement and, more broadly, with the pedagogical and intellectual mission of the GE curriculum; and 2) to determine whether the process and format of external reviews for the GE curriculum may require emendation in order to provide optimal continuing assessment of the foundational areas both individually and collectively.

The review team consisted of one internal reviewer (Lowell Gallagher, English, Undergraduate Council) and one external reviewer (Thomas J. Carew, Neurobiology and Behavior, University of California, Irvine). Meetings were held in A-244 and 2300B Murphy Hall; because of the multiple divisional and departmental housing of the SI foundation, no walk-through visits were scheduled. During the site visit the review team met with Vice Provost for Undergraduate Education Judith Smith and Raymond Knapp, Chair of the GE Governance Committee; the Chair (Raymond V. Ingersoll) and Ad Hoc Committee of the SI Foundation Area; the Deans of Physical and Life Sciences (Joseph Rudnick, Emil Reisler, Fred Eiserling); and faculty as well as graduate students who have regularly taught courses in SI. After comparing notes from the site visit and the Self-review assembled by the SI Ad Hoc Committee, both members of the review team found that the assessments in the Self-review report present a model of attentive inquiry and well-reasoned judgment. The review team believes that the report's characterization of the current state of the SI curriculum as well as its recommendations should be endorsed. In the present document, quotations from the Self-review are cited as SR and those from the external reviewer's report are cited as Carew.

Mission and Implementation of the Scientific Inquiry Foundation Curriculum

The mission statement for the SI curriculum defines two broad intellectual aims: to ensure that all UCLA students, regardless of major, “gain a fundamental understanding of how scientists formulate and answer questions about the operation of both the physical and biological world” (SR, 2); and to expose students to “some of the most important issues, developments, and methodologies in contemporary science.” The mission statement further stipulates the range of pedagogical tools to be used in SI courses: “lectures, laboratory experiences, writing, and intensive discussion.” While the SI foundation has been largely successful in observing these directives, the review team found several areas in which improvement of existing practices is called for. (It concurs in this regard with the appraisal in the Self-review report.)

The SI curriculum boasts a healthy number of offerings (ninety-five courses), and the range of courses is evenly distributed across physical and life science areas (forty-two in life sciences, forty-six in physical sciences, with seven satisfying requirements for either area; cf. SR, 7). Closer scrutiny reveals significant imbalances that need to be corrected in order to realize fully the goals of the new GE curriculum. The distinction between the so-called “pre-major GE” (lower-division science courses required for science majors) and the “generalist GE” (designed specifically for non-majors) is built into the GE curriculum; this structural feature can claim the intellectual merit of promoting, under ideal circumstances, a wide range of topics suitable to the General Education rubric. However, the two types of GE courses are not represented equitably across the disciplines. Some of the large departments, such as Chemistry and Biochemistry, with many service courses equipped to do double duty as “pre-major GE” offerings have conspicuously few (if any) generalist GE courses. At least two worrisome consequences arise from this imbalance. First, some of the current “pre-major GE” offerings are doing little more than lip service to the SI mission, in the sense that the audience for these courses is precisely *not* the students who enroll as generalists rather than pre-majors. Because of this discrepancy, the total number of SI courses actually available to students seeking to fulfill the GE component of their education may be lower than the schedule of classes indicates during a given term. Second, many of the most thematically adventuresome SI courses – courses designed in the spirit of the SI mission to familiarize students with the vocabulary and procedures of important topics in contemporary science, such as “the origin of the universe, environmental degradation, and the decoding of the human genome” (SR, 2) – have so far been the responsibility of smaller departments or subfields (e.g., Anthropology, Astronomy, and Earth & Space Sciences, among others). By no coincidence, as the Self-review indicates, SI offerings in emerging fields are also conspicuously absent (e.g., genomics and nanotechnology). The concern here is not simply the unequal distribution of departmental participation in GE instruction but the failure to mobilize cross-departmental resources adequately in the service of the campus-wide investment in the GE curriculum. As many of the faculty interviewed suggested, it is likely that some algorithm of staffing limitations, space and funding limitations (particularly with regard to the mandated laboratory experience), rigorous course

requirements already in place for the major, and a culture of relative disinterest in the GE component to undergraduate education accounts for the underrepresented departments in the SI foundation. Serious inquiry into the root causes of this imbalance nonetheless needs to be pursued, and the means should be found to promote a higher number of generalist GE courses from larger departments and to enhance “south campus” interest in developing cross-listed thematic GE courses with interdepartmental investments in which both material and intellectual resources would be profitably shared.

One of the most serious obstacles to fulfilling the SI mission concerns the mandated component of laboratory experience. The problem was registered by virtually every group interviewed by the site team. As the Self-review accurately points out, there are two parts to the problem. First, the number of SI courses offering lab/demo credit is too low to meet the demand of the undergraduate population. Consider this statistic: of the thirty-two lab/demo courses currently available, only twelve are in the life sciences area. (Lab/demo requirements per College or School are listed in SR, 6.) Second, some of the courses conferring lab/demo credit have been found seriously deficient in meeting the presumed goals of the lab/demo requirement to provide a “hands-on or otherwise direct experience illustrating how scientists examine and interpret their data and employ the scientific method” (SR, 15). The problem of ersatz laboratory experience can be solved by devising “specific standards and principles for lab/demo credit” (SR, 15). Some of the faculty and deans interviewed called attention to the need to think creatively about how to conceive of relevant simulations of the kind of experience expected for lab/demo credit (e.g., imaginative application of computational resources). Some of the faculty also thought such simulations could have the further merit of strengthening the GE quantitative reasoning requirement (cf. Carew, 2 and SR, 4). A more intractable problem resides in the fact that lab space at UCLA is at a premium, and it is not clear whether the timeshare deals among various units for use of existing lab space can be modified to accommodate the additional needs of SI courses. Such needs, it should be said, are likely to increase over time as the GE curriculum grows.

Governance and Maintenance of the SI Foundation

This section elaborates some of the concerns mentioned above. The discrepancy between “pre-major” and “generalist” SI courses indicates two principal areas where oversight of the foundation area curriculum can be improved. (Additional suggestions follow in the section below.) First, all courses seeking admission into the SI curriculum should be required to submit detailed syllabi that meet articulated standards conforming to the SI mission statement and, in the case of courses designed to meet the lab/demo requirement, explaining how the course proposes to meet that requirement. Second, syllabi of courses currently offered should also be reviewed on a regular basis to ensure continued conformity to the goals of the GE curriculum (cf. Carew, 3). The aim of these measures is to enable the SI Governance Committee to better determine which courses, especially among the high number of “pre-major” offerings, merit GE status, and which, in the “generalist” category, adequately meet the standards of the GE lab/demo requirement.

The relative dearth of “generalist” SI courses indicates a real need on the part of departmental and divisional administrative officers to come up with a multi-pronged strategy for developing a cadre of new (and revised) SI courses. The review team concurs on all points with the specific recommendations of the Self-review report, which are summarized in the following section.

Successful delivery of the SI curriculum depends on broad and reliable dissemination of the contents and aims of available courses. The site team’s conversations with ladder faculty, lecturers, and graduate students involved in the teaching of SI courses and related cluster courses corroborate the judgment found in the Self-review report. Delivery of adequate information is not yet optimal. The word-of-mouth network among undergraduates may be extensive but it should not be relied upon to convey reliable information or intellectually worthy principles of selection. The electronic syllabus-abstract project, properly implemented, provides a useful conduit, but it is also limited in the sense that it cannot provide the necessary interpretation of various options available to the individual student. One of the most vital ways to recognize the significance of the SI curriculum is to develop, by all means possible, the available resources of the academic counseling staff.

Recommendations

As the external reviewer points out, the Scientific Inquiry foundation, together with the general GE program to which it belongs, is “a jewel in the crown of the academic experience provided the undergraduates at UCLA” and “a model for all others to emulate” (Carew, 3). The long-term success of the SI foundation, however, depends on the ability of several agents – the GE Governance Committee, the administration of the participating divisions and departments, and GE faculty – to work together to maintain the academic strengths of the program and correct current deficiencies. The latter fall into three groups: Governance, Course Development, and Communication.¹

1. Governance

- A. The GE Governance Committee is in the process of defining and regularizing the scope of its oversight. The review team concurs with the Self-review report in recommending that one of the most important goals of the Committee should be to take steps to produce and implement criteria for “better developed and standardized syllabi” (SR, 15) to ensure that SI courses are equipped to fulfill the special charge of the SI foundation as described in the mission statement. Such steps include:

¹ The GE Governance Committee, currently an ad hoc entity, is expected to be regularized in the near future: given clear definitions of its jurisdiction, parliamentary status, and relation to UGC. This report understands that its recommendations are directed principally to the GE Governance Committee (however constituted) and to the Vice Provost for Undergraduate Education. Where applicable, further designations are noted after specific recommendations below.

- 1) Regular monitoring of course content via the electronic syllabus abstract system.
- 2) Regular review of sample of course offerings (as the SR report suggests, 20% annually would ensure that the entire SI curriculum would pass under review every five years). Procedures for evaluation of new courses should be put in place to ensure that discrepancies between proposed courses and the specific goals of the SI foundation area are discovered and corrected early in the process of certifying new courses.
- 3) Regular evaluation of the lab/demo component. There is no denying the pedagogic importance of the “wet lab” experience in the SI curriculum. Departmental and divisional administrative officers should make concerted efforts to identify and / or create both budgetary resources and mechanisms for more flexible sharing of available physical space that will enable a higher number of SI courses with a genuine “wet lab” component to be offered on a regular basis.
[Attn: Interim Dean Rudnick, Dean Reisler, Vice Provost Smith.]

2. Course Development

- A. The number and thematic range of generalist courses in the SI foundation needs to be increased. To this end, incentives need to be identified and implemented at both departmental and divisional levels. The possibility of redistributing teaching requirements or options (especially among ladder faculty in departments where ladder faculty representation in GE courses is low) should be examined. Departments should also be encouraged to develop “bundled” inter-departmental GE courses linked by common themes; such courses would constitute a “family of mini-curricula” that would replicate some of the pedagogical and intellectual features of the Freshman Cluster Program on a smaller scale (Carew, 1). This type of initiative would likely contribute significantly to the stature and popularity of the generalist repertoire. The initiative would also relieve impacted departments from shouldering the burden of the GE curriculum. Further, it would provide the structural means to build GE courses bridging the intellectual resources of north and south campus curricula.
[Attn: Vice Provost Smith.]
- B. Apart from the recommendation to create a spectrum of inter-departmental GE courses, the review team endorses the Self-review report’s strong recommendation that current gaps in the SI curriculum should be filled. These include significant under-representation of courses in areas such as chemistry, psychology, nanotechnology, and genetics (cf SR, 16). While logistical impediments (such as ladder faculty teaching requirements in non-GE curriculum) account for some departments’ relative lack of involvement in the

GE curriculum, departmental and divisional administration should work together with the GE Governance Committee to identify ways in which specific departmental cultures may be encouraged to promote intellectual and pedagogical interest in the GE curriculum. (In some, but not all, instances, the creation of “bundled” SI courses as described above may address this concern successfully.) A useful initiative would be to compile a “wish list” of future generalist SI courses, including topics that would generate inter-departmental commitment, and to allocate material resources to implement them. This action would fall within the province of the GE Governance Committee in consultation with Vice Provost Smith.

- C. While recognizing the academic importance of the “wet lab,” the review team wants to underscore the need to create viable alternative models for lab/demo credit. Several avenues should be considered, including the following:
- 1) Collecting information on alternate models from other academic institutions would be a highly useful first step.
 - 2) Promoting “bundled” SI curriculum would likely encourage the development of viable substitutes for the “wet lab” experience. Incentives to this end from the divisional administrators should be promoted.

3. Communication

- A. Though it has limited oversight responsibility over those SI courses that satisfy departmental pre-major requirements, the GE Governance Committee should institute a clearer set of directives indicating ways in which pre-major courses and generalist courses may satisfy the GE SI requirement. Such directives would give students as well as teaching faculty and departmental administrative officers a clearer sense of relevant distinctions among pre-major courses across the SI divisions (e.g., levels of difficulty and degrees of disciplinary focus). On a case-by-case basis, pre-major courses with no more than nominal GE qualifications could be modified to include discussion sections for the GE students.
[Attn: Department Chairs and Vice Provost Smith.]
- B. The success of the directives issued by the GE Governance Committee depends on adequate counseling to ensure students understand the range of expectations associated with different types of SI courses (e.g., generalist vs. pre-major courses). As the external reviewer points out, it crucial that academic counselors become “fully conversant with the actual content of different GE courses,” not least because it is through counseling that many students may encouraged to investigate SI offerings beyond those courses judged (whether accurately or no) easy or relatively painless. Divisional and departmental administrators should provide enhanced staff support to meet this need.
[Attn: Vice Provost Smith.]

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Addendum: The Review Process

1. The site team found that the format and schedule of regular reviews for the three GE foundation areas proposed by Vice Provost Smith and approved by the Undergraduate Council (cf. SR, 5) should be adequate to maintain proper oversight of the GE curriculum.
2. The site team also endorses Vice Provost Smith's further suggestion that each department's contribution to the GE curriculum must be evaluated in the course of regular eighth-year departmental reviews. This practice will both reinforce the university's commitment to General Education and help identify specific ways in which departments can refine their GE curriculum. In addition, the administration should identify and fund mechanisms for rewarding superlative GE teaching across the three foundation areas.
[Attn: Vice Provost Smith.]
3. One lacuna in the current schedule for foundation area reviews needs to be addressed. By nature the GE curriculum is dispersed across many units on campus, and it is also built into the system-wide UC undergraduate curriculum. Currently, the GE curriculum at UCLA has no real means of taking advantage of the broad perspectives and experience to be found across the different campuses. The review team recommends that the GE Governance Committee, with the support of the university administration, consider implementing an annual UC-wide workshop (or similar format) for GE instructors and administrators that would serve as a forum for the exchange of information on innovative curriculum.
4. The next external review of the Scientific Inquiry General Education Foundation Area should be conducted during the academic year 2014-15.