

**2014-15 ACADEMIC SENATE PROGRAM REVIEW OF THE
GENERAL EDUCATION REQUIREMENT IN
FOUNDATIONS OF SCIENTIFIC INQUIRY**

Internal Reviewers

James Gober, Undergraduate Council, Chemistry and Biochemistry, Review Team Chair
David Phillips, Undergraduate Council, History

External Reviewer

Barbara Sawrey, University of California San Diego, Associate Vice Chancellor for
Undergraduate Academic Affairs

Date of Site Visit: December 17, 2015

Date of Report: May 20, 2015

Approved by Undergraduate Council: June 5, 2015

Appendix I: External Reviewer's Report

Appendix II: Site Visit Schedule

Appendix III: Self-Review Report (The self-review report was previously distributed. If you need a hard copy, please contact the Academic Senate Office at extension 62959.)

2014-2015 Academic Senate Program Review of the General Education Requirement in Foundations of Scientific Inquiry

Introduction

The review of the General Education requirement in Foundations of Scientific Inquiry (FSI) was conducted on December 14, 2014 by a team comprised of two members of the Undergraduate Council and one external reviewer. The Undergraduate Council members were James Gober (Chemistry and Biochemistry, review team Chair) and David Phillips (History). The external reviewer was Barbara Sawrey from University of California, San Diego where she serves as Associate Vice Chancellor for Academic Affairs, Dean of Undergraduate Education, and Distinguished Teaching Professor in the Department of Chemistry and Biochemistry. The conclusions of this report are based on the summary of the most recent self-review of the FSI curriculum conducted by an Academic Senate-appointed *ad hoc* committee, issues statements, and meetings with Deans, faculty, and students during the course of the one-day site visit.

The General Education (GE) requirements at UCLA encompass three foundation areas: Foundations of Arts and Humanities, Foundations of Society and Culture, and Foundations of Scientific Inquiry. This review focuses on the FSI curriculum for non-BS majors within the College of Letters and Sciences. The College FSI requirement consists of a total of four courses, with two from the Division of Life Sciences and two from the Division of Physical Sciences. One from each Division must have a laboratory component. The GE Governance Committee and Undergraduate Council provide oversight and course approval for the FSI curriculum. The GE FSI curriculum comprises a diverse array of subject areas. The many faculty who contribute to the curriculum are to be highly praised and appreciated for their outstanding and valued engagement in undergraduate general education. Likewise, the GE Governance Committee should be commended for their continuing commitment to the oversight of this important component of the undergraduate curriculum.

The GE FSI *ad hoc* self-review committee determined that several significant improvements to the FSI curriculum could be instituted. This review team generally agrees with the insights of the *ad hoc* self-review committee. Below we focus on those areas that are in critical need of improvement.

The Laboratory Requirement

The GE FSI two-laboratory requirement was suspended in 2010 at the request of the College Deans and the suspension was approved by the College FEC and Undergraduate Council (UgC). The revised requirements consisted of four courses with one being a laboratory course. Following a review of the FSI requirements in 2012 by an *ad hoc* committee, the suspension was continued for an additional two years (approved by FEC and UgC). In late 2012, following the Senate-appointed *ad hoc* GE FSI self-review committee report, the FEC, in consultation with the College Deans, voted that the second laboratory requirement be suspended for an additional three years. This suspension was approved by UgC.

Should the suspension of the second laboratory requirement continue on a temporary or permanent basis? There are conflicting views regarding this central question. The *ad hoc* self-review committee report contains a thorough analysis of the feasibility of restoring the second laboratory requirement. The report contains a quantitative analysis of ‘empty seats’ and ‘enrollment versus expected audience’. This analysis, in conjunction with the perceptions of Departmental Chairs, led to the conclusion that restoration of the two laboratory requirement could be accomplished in an economically feasible fashion. In contrast, these findings have been challenged by the Deans of Life and Physical Sciences. It is the opinion of this review team that these conflicting views stem from differing perceptions as to what constitutes a laboratory course.

There is little doubt that the existing instructional laboratory space in Life Sciences and Physical Sciences is severely impacted. Many of these laboratories are used twelve hours a day during the week and sometimes on weekends. Thus the conclusion by the Deans that a second laboratory requirement is not feasible, seems reasonable with regard to traditional instructional laboratory exercises. In contrast, the data utilized by the *ad hoc* self-review committee focuses on current GE FSI laboratory courses. Most of these courses do not contain ‘laboratory’ activities that would occur in traditional biology or chemistry instructional laboratories. The students in these courses are learning about methods of scientific inquiry but are not utilizing wet laboratory skills. As summarized by the external reviewer (Sawrey):

‘...the FSI courses that currently count toward the lab requirement do not meet the traditional definition of a laboratory. Rather, they are composed of activities that occur outside of a lecture format, and that require individual or group efforts to learn about a phenomenon, make and test a hypothesis, and/or analyze data. They are “minds-on” activities, but not hands-on activities in a traditional chemistry/biology/physics wet facility format.’

It is the opinion of this review team that the second laboratory course requirement should be restored. However, in doing so, the name of the requirement should be changed to accurately reflect the educational activity. The overall educational objective in offering laboratory courses is that the students learn how scientific methods are utilized in data acquisition and analysis. While this could be accomplished in a lecture course setting, the concepts are far more powerfully conveyed when the students perform their own data acquisition and analysis. Freeing scientific inquiry from the space limitations of a wet laboratory experience would make it feasible and advantageous to incorporate this brand of experiential learning into most GE FSI courses. An excellent example of one way this could be accomplished is provided by Life Sciences 2/3L, an inquiry-based laboratory course in which a traditional lecture is accompanied by on-line laboratory exercises. Other examples could include courses based on methods of computational and statistical analysis, modeling, simulations, etc. The external reviewer, Dean Sawrey, provides additional suggestions:

‘The students in the currently approved lab courses are learning scientific thought and inquiry, but not wet lab skills. Therefore it is my suggestion that the laboratory requirement be renamed (e.g. discovery, field work, analysis, practical work, or something else), and that some general guidelines for that new designation be developed by the GE Governance Committee.’

The GE governance committee should provide guidelines and information with regard to the nature of the inquiry-based student exercises in these courses and, importantly, establish guidelines for standards of rigor. These activities should not just involve approval of new courses, but also be applied to a review of existing FSI courses. As suggested by Dean Sawrey, additional roles for the GE governance committee could include:

‘...periodically reviewing existing FSI courses; making sure that all the FSI course syllabi are available online for student, staff, and faculty to see; making sure that the mission of the FSI requirement is met through regular assessment of student outcomes, and; defining and describing the nature of the lab requirement.’

Course Diversity and Distribution

There is a skewed distribution of the courses non-BS majors take in order to satisfy their GE FSI requirements. As highlighted in the report by the *ad hoc* self-review committee, at least two-thirds of these students are enrolled in six courses. Approximately 50% are enrolled in a Life Science laboratory course (Phy. Sci. 5). One concern is the limited distribution of courses across departments. The Dept. of Chemistry and Biochemistry and the Dept. of Physics provide courses for a large number of pre-major BS students across campus and they should be applauded and appreciated for their efforts. However, their contributions to GE FSI are small or non-existent (Chemistry). It is the conclusion of the review team that there should be a wider distribution of GE FSI department offerings to non-BS majors. Notably Chemistry/Biochemistry and Psychology (a department that does little service teaching) should be strongly urged to contribute to the GE FSI curriculum (see specific recommendations). This contribution could come in the form of individual GE FSI courses or participation in GE cluster courses that would satisfy the FSI requirement.

It should be noted that a significant fraction of GE FSI non-laboratory course enrollments occur in courses offered by Social Sciences and Humanities. This is likely attributable to the relative lack of an even distribution of courses but also reflects the changing nature of scientific inquiry. Modern research requires collaborative, cross disciplinary approaches. It was the opinion of the GE FSI *ad hoc* self-review committee report that this shift in scientific research methodologies should be reflected in the mission statement of GE FSI. This review team enthusiastically endorses this view and urges a revision of the GE FSI mission statement to mirror current science culture.

Recommendations

To the GE Governance Committee, the Faculty Executive Committee, and the Undergraduate Council:

1. Redefine the ‘laboratory’ component of GE FSI courses to include inquiry-based experiential learning activities illustrating how scientific methods are utilized in data acquisition and analysis. These may include, but are not limited to, field studies, on-line laboratory exercises, methods of computational and statistical analysis, modeling, and simulations.

2. Conduct an analysis on the needs (resources, classroom space, instructors, etc.) for a restored two-laboratory requirement. The needs analysis should take into account faculty who are willing to modify their existing GE courses to add experiential lab experiences. Should this analysis reveal enough capacity, reinstatement of the two-laboratory requirement should be initiated after a sufficient period of time for the creation and approval of newly defined experiential ‘laboratory’ courses. The review committee recommends implementation no earlier than the 2016-17 academic year.

To the Executive Vice Chancellor, the Vice Provost for Undergraduate Education, and the College Deans:

3. Provide incentives in the form of FTEs, teaching release, summer salary, etc. to departments for more active involvement in the offering of GE FSI courses. These could be applied to all relevant departments, but it is critical the departments that are not at a suitable level of engagement (i.e. Chemistry/Biochemistry, Psychology) with GE FSI be strongly urged to participate. If faculty are unable to mount their own GE course, then perhaps they can participate in GE clusters that satisfy the FSI requirement.

To the GE Governance Committee:

4. Provide guidelines and information with regard to the development and approval of redefined ‘laboratory’ courses and establish guidelines for standards of rigor. These activities should not just involve approval of new courses, but also be applied to a review of existing GE FSI courses.
5. Revise the mission statement of GE FSI to better reflect the collaborative and multi-disciplinary nature of modern scientific thought and research practices.
6. Insure that the syllabi of all GE courses are freely available and easily accessible.
7. Make clear to faculty that grading of GE courses should adhere closely to University grading policies.
8. Establish a rotating timeline for the evaluation of all GE FSI. The GE FSI *ad hoc* report suggested one-fifth of the existing courses each year.

Final Recommendation

The Undergraduate Council recommends scheduling the next review of the General Education Requirement in Foundations of Scientific Inquiry on a regular eight-year cycle in 2022-23, pending a satisfactory progress review.

Respectfully submitted,

James Gober, Undergraduate Council, Chemistry and Biochemistry, Review Team Chair
David Phillips, Undergraduate Council, History

Appendix I: External Reviewer's Report

Barbara Sawrey, University of California San Diego, Associate Vice Chancellor for
Undergraduate Academic Affairs



OFFICE OF THE ASSOCIATE VICE CHANCELLOR FOR ACADEMIC AFFAIRS and
DEAN OF UNDERGRADUATE EDUCATION
TEL: (858) 822-4358
avcdu@ucsd.edu

9500 GILMAN DRIVE
LA JOLLA, CALIFORNIA 92093-0001

January 13, 2015

Professor James Gober
Chair, Review Team for General Education Scientific Inquiry
Department of Chemistry & Biochemistry
c/o UCLA Academic Senate Office

Dear Jim,

It was a pleasure to serve with you and David Phillips, in December, on the team to review UCLA's General Education requirement in Foundations of Scientific Inquiry (FSI). Below I provide my input on the major issues raised in the review, and end by addressing some of the minor issues that also came up. Of course, the Academic Senate members in the UCLA division "own" the requirements, but I hope this brief feedback will be helpful as you move forward. The *ad hoc* committee that carried out the self-review is to be applauded for their attention to the FSI requirement. Meeting with them, as well as many other stakeholders throughout the day of the review, was very helpful, but it is always the case that someone from another campus cannot completely appreciate the culture of the campus under review. So please view my comments with the spirit of collegiality intended, and feel free to contact me if you would like more detail in any area.

The Laboratory Issue

In 2010, campus reduced the FSI laboratory requirement from two courses to one, without changing the total requirement of two physical science courses and two life science courses. This suspension of the two-lab requirement remains in effect, with proponents on both sides of the issue. Since I am a scientist, I expected to find myself firmly on the side of advocating for a return to two labs – at least that was the case until being part of this review.

Many (most?) of the FSI courses that currently count toward the lab requirement do not meet the traditional definition of a laboratory. Rather, they are composed of activities that occur outside of a lecture format, and that require individual or group efforts to learn about a phenomenon, make and test a hypothesis, and/or analyze data. They are "minds-on" activities, but not hands-on activities in a traditional chemistry/biology/physics wet facility format.

The activities I learned about are excellent, and every FSI course should be encouraged to include them. But I believe use of the term "lab" is both misidentifying the nature of the work involved, and off-putting to the non-science students, as well as to the very departments (e.g. Chemistry & Biochemistry) the campus wishes to be more involved with FSI.

The students in the currently approved lab courses are learning scientific thought and inquiry, but not wet lab skills. Therefore it is my suggestion that the laboratory requirement be renamed

(e.g. discovery, field work, analysis, practical work, or something else), and that some general guidelines for that new designation be developed by the GE Governance Committee. These guidelines could include weekly or quarterly time expectations, and information about the nature of the guided inquiry students should perform. Guidelines would also allow a standard for rigor to be established. It would be ideal if all FSI courses developed such a section to accompany their lecture. Capacity should not be an issue once departments understand that their scarce lab facilities are not what is needed to meet the requirement.

GE Governance Committee

The GE Governance Committee appears to be the only infrastructure tasked with any FSI oversight, but the GE requirement is in need of more cohesive attention. The GE Governance Committee currently reviews new courses proposed to meet the FSI requirement. It seems to be the appropriate body to take on some additional, more global oversight roles that are needed. These roles could include: periodically reviewing existing FSI courses; making sure that all the FSI course syllabi are available online for student, staff, and faculty to see; making sure that the mission of the FSI requirement is met through regular assessment of student outcomes, and; defining and describing the nature of the lab requirement. If any of these items are thought to fall outside the purview of this Senate committee, then the administration should be consulted about how to manage them in a collaborative way.

Departmental Participation

Every physical science and life science department should have at least one course that meets the requirement. The EVC and deans are encouraged to find appropriate incentives that could be offered directly to the departments or to faculty for their involvement.

Smaller Issues

Two remaining things that could use additional attention are: encouraging consistent TA training for these important courses for non-science majors, and improved ongoing communication with the campus advising offices.

Summary

I support the lifting of the suspension of the two-laboratory requirement, contingent on redefinition of what is a suitable FSI laboratory, and what satisfies that component. I also support expanding the duties of the GE Governance Committee to provide more oversight for the FSI requirement. And I support finding a way to encourage the Department of Chemistry & Biochemistry to participate in providing an FSI course – with or without a lab component.

Sincerely,

Barbara A. Sawrey
Associate Vice Chancellor for Academic Affairs and
Dean of Undergraduate Education
Distinguished Teaching Professor, Department of Chemistry & Biochemistry

cc: Matt Robinson, Academic Senate

Appendix II: Site Visit Schedule

- 3:00 Administrative Meeting (Review Team only)
- 4:00 Exit Meeting: 2121 Murphy – The meeting includes Review Team, GEGC Chair **Joseph Nagy**, Executive Vice Chancellor and Provost **Scott Waugh**, Vice Provost for Undergraduate Education **Pat Turner**, FEC Representative **William Newman** and CPB Representative **Richard Weiss**.

Program Staff Contact: Greg Kendrick (gregk@college.ucla.edu; 310-206-0831)
Tony Friscia (tonyf@ucla.edu, 310-206-6011)

Academic Senate Staff Contact: Matt Robinson (mrobinson@senate.ucla.edu; 310-825-1194)

Note:

- 1) Please allow appropriate flexibility to permit sufficient time for student meetings, especially in a department that has multiple degree programs.
- 2) TAs will have the opportunity to meet without departmental faculty, staff, or administrators present to allow the review team the opportunity to speak frankly with TAs from the department.
- 3) The unit is encouraged to select TAs who represent a broad range of TA experiences (TAs who have taught large classes, small classes, labs (if applicable), introductory classes, upper-division classes, etc.)
- 4) The review team chair should make every effort to ensure sufficient time for all meetings scheduled.
- 5) The schedule should be flexible and accommodate review of any and all articulated, concurrent, and self-supporting programs.

Appendix III: Self-Review Report

(The self-review report was previously distributed.

If you need a hard copy, please contact the Academic Senate Office at extension 62959.)