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October 2, 2013

To: Patricia Turner
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General Education Governance Committee
Leobardo Estrada, Chair
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Christina Palmer, Chair
Faculty Executive Committee

From: M. Norton Wise, Chair
Ad Hoc Self-Review Committee, Foundations of Scientific Inquiry

Re: Report: Self-Review Committee for Foundations of Scientific Inquiry

With this memo I am forwarding to you the Report of the *Ad Hoc* Committee for Self-Review of the GE Curriculum in Foundations of Scientific Inquiry. The Report results from the committee's deliberations during the winter and spring quarters of 2013 concerning the status of the FSI foundation area. It is less a review of individual courses than a structural review of the curriculum, with special attention to issues that have arisen since the last review in 2006, especially the question of the laboratory requirement, and to issues raised then that continue to be cause for concern, such as the diversity and distribution of courses for students who are not pursuing Bachelor of Science degrees.

The Committee is pleased to report that the overall GE FSI curriculum is strong and healthy, both for BS majors and for non-BS majors. The number of dedicated faculty who provide this rich curriculum is truly impressive. They should be celebrated. Nevertheless, we have isolated areas where improvements are needed. Our recommendations for those areas are collected at the end of the Report. Here is a brief outline.

- The two-lab requirement should be reinstated.
- A few large departments need to provide more non-BS courses.
- Non-BS students should be enrolling in a broader spectrum of courses.
- The conception of FSI courses and laboratories should be expanded.
- A website that includes informative syllabi for all FSI courses is needed.
- The GEGC should establish a rotating evaluation of all FSI courses.

The Committee has found our discussions both stimulating and informative. We are pleased to offer these recommendations for further action.

REPORT:

Ad Hoc Committee for Self-Review

of the

GE Curriculum in

Foundations of Scientific Inquiry

Contents

I. Preface

Over the course of a ten-year effort, from 1996 to 2006, UCLA established a campus-wide framework for General Education (GE). Since then all incoming freshmen satisfy their GE requirements by taking a requisite number of courses in three foundation areas of knowledge: *Foundations of Arts and Humanities*, *Foundations of Society and Culture*, and *Foundations of Scientific Inquiry* (FSI). Deliberations over the curriculum for FSI, with which we are concerned here, were guided by a mission statement (see Section VI below) which reflected several desiderata for student learning: familiarity with the ways in which scientists create, discover and evaluate knowledge; ability to compare and synthesize different disciplinary perspectives; ethical awareness and cultural sensitivity; and strong basic intellectual skills. Within this conception of the curriculum, which focused on general education, an important question was whether courses designed as preparation for a BS major should be included in GE. The decision was positive. As a result two basic categories of GE courses exist, those for BS majors and those for non-BS majors. Although there is some overlap between these categories, in practical terms they have different functions and are treated quite separately. *This report will focus on courses for non-BS majors.*

Somewhat similarly, the FSI requirements adopted by the College of Letters and Sciences differ from the various Schools of the University: Arts and Architecture, Theater, Film and Television, Engineering and Applied Science, and Nursing. *We will be considering only the College requirements*. They are the most the most stringent: Four courses total, with two from each of the Divisions of Life Sciences (LS) and Physical Sciences (PS), one of which from each Division must be a 5-unit course carrying laboratory credit (or demonstration or Writing II credit, although these are rare).

The Undergraduate Council (UgC) and the General Education Governance Committee (GEGC) have agreed that there should be periodic reviews of the three foundation areas of GE every six years. The first review for FSI occurred in 2006-07. Thus the present Self-Review begins the second cycle. While the first review was conceived as a overview of the FSI Curriculum, this second review concentrates on specific issues.

The Report is divided into sections addressing these different issues, with a concluding summary of recommendations developed in the sections.

II. The Committee and its Charge

The *Ad Hoc* Review Committee for Foundations of Scientific Enquiry was appointed in November 2012 jointly by the Chair of the GEGC, Scott Chandler, and the Vice Provost for Undergraduate Education, Judith L. Smith. Members of the Committee were drawn primarily from the Life Science and Physical Science Divisions of the College of Letters and Sciences, with strong representation from GE curriculum organizers. Professor M. Norton Wise, historian of science and former director of the Institute for Society and Genetics, served as chair. Anthony Friscia played a key role as knowledge base and data analyst. Rayna Jackson of Undergraduate Education Initiatives provided administrative support, assembling resources from many University offices and organizing meetings.

The members of the Ad Hoc Review Committee were:

M. Norton Wise, Chair (History)
Anthony Friscia (GE Science Coordinator; Integrative Biology and Physiology)
Amandar Clark (Molecular, Cell and Developmental Biology)
Robert Fovell (Atmospheric and Oceanic Sciences)
Ohyun Kwon (Chemistry and Biochemistry)
James Larkin (Physics and Astronomy)
Jessica Lynch Alfaro (Institute for Society and Genetics)
Kevin McKeegan (Earth and Space Sciences)
David Paige (Earth and Space Sciences)
Deb Pires (Life Science Core)
Keith Stolzenbach (Civil and Environmental Engineering)
Blaire Van Valkenburgh (Ecology and Evolutionary Biology)

The Committee was charged “to explore a range of issues and questions relating to the Scientific Inquiry foundation area’s pedagogical aims, requirements, course quality, and student enrollments” (see Appendix A). Informally it was hoped that we would look at some larger themes related to science GE. Thus we have interpreted our charge in a manner both selective and expansive, devoting our attention to items that seemed most in need of reflection and analysis.

Those items derived in the first instance from the previous full-scale review in 2006-7, consisting of a thorough self-review, a site visit by internal and external reviewers, and a summary review approved by the Academic Senate. The overriding concern emerging from these reports was the limited number and thematic range of all courses appropriate for non-BS majors (typically BA majors). Furthermore, the available non-BS courses were found to be very unevenly distributed across departments, with large fields like Chemistry, Physics, and Psychology offering either zero or one of these courses. Of equal concern was the variety and distribution of specifically laboratory courses appropriate for non-BS majors. A very few courses enrolled the bulk of these students. For example, Physiological Science 5 (Human Physiology—Diet and Exercise) accounted for one third of those satisfying the LS laboratory requirement, while Astronomy 3 (Nature of the Universe) accounted for 27% of those satisfying the PS requirement.

The issue of insufficient laboratory courses came to a head in 2012 when the Vice Provost for Undergraduate Education and the College's Faculty Executive Committee appointed an ad hoc committee to evaluate the GE requirements in FSI, as stated above: four courses overall, two each in LS and PS, with two laboratory courses, one each in LS and PS. In Fall 2010, as a temporary measure responding to perceived budgetary and space constraints on providing sufficient laboratory capacity, the requirement had been reduced to one laboratory course in either LS or PS, and the committee was asked to evaluate whether that suspension should be continued. The committee, chaired by Kevin McKeegan (serving also on the present Committee, along with Fovell, Friscia, Kwon, and Van Valkenburgh), recommended a two-year continuation of the suspension for 2012-14 with a reevaluation in 2013, which was adopted by the College FEC and UgC. Accordingly, the FEC and UgC in October 2012 requested from all chairs of Life Science and Physical Science Departments and CIIs a response to a series of queries aimed at determining whether the full GE FSI requirements should be reinstated or the one-laboratory suspension should be made permanent. (Appendices B and C contain the request letter and the chairs' responses.) They also requested of the present Self-Review Committee that we make the question of the lab requirement a key part of our charge.

With this question at the core of our work, we have made an extensive analysis of FSI lecture and laboratory courses offered since the last review, trends over time, laboratory capacity, departmental participation, course diversity, faculty engagement, and course quality. We have also reexamined the stated aims of FSI courses and laboratories and considered possible innovations that might enhance the variety and attractiveness laboratory course offerings.

III. Basic Perspective of the Committee

The Committee, like its predecessors, subscribes to the view that the GE curriculum should be aimed at training "citizens of the modern world." For FSI this may be taken to mean concretely that successful students should be able profitably to read such things as the *Science Times* of the *New York Times*, critically reflect on claims made, and know where to look for supplementary information. That is a high bar but one to which we should aspire. This perspective is reflected throughout our review.

As noted above, the Committee has concerned itself primarily with the FSI requirement for non-BS majors. BS majors appear to be very well served by the present curriculum. But all students at UCLA should have the opportunity to enjoy attractive courses in the natural sciences and to gain an appreciation for the methods and accomplishments of modern science. Although reliable numbers are hard to find, around half of all UCLA graduates do not go on to post-graduate education of any kind. That means for most students that their scientific literacy, and even more importantly their curiosity about the natural world, rests on the dedication of GE FSI instructors. Lest the import of this responsibility not be fully apparent, we want to emphasize not only the pervasive role of the natural sciences and their related technologies in every aspect of contemporary life, but also that the public trust in science seems to be at a low ebb, whether with respect to vaccines, climate change, evolution, or the fluoridation of drinking water. Seen in this light, contributing to the FSI curriculum is a social responsibility to enhance scientific knowledge and engagement. It is a responsibility that should be shared by all fields of the natural sciences.

We also think that in order for students and citizens to more fully appreciate the role of science in the modern world, it should be presented less in its idealized and simplified aspects and more nearly in its often messy complexity. An important aspect of this complexity is the systemic cross-disciplinarity of much contemporary research. As has often been said, the problems of the world do not come in disciplinary boxes. Consequently most funding agencies and universities around the country are promoting research that crosses existing departments and are establishing new institutes dedicated to that project (e.g. UCLA's California NanoSystems Institute). This desideratum has also appeared in earlier reviews. It suggests directions in which new courses and laboratories might be developed for the FSI curriculum (Section VI).

In the individual sections of this report, we will document the overall strength of the FSI curriculum along with a few weaknesses. But we want first of all to congratulate the contributors to FSI courses on their overwhelmingly positive contribution to the goal of educating "citizens of the world." The Committee has been impressed with how seriously the overwhelming majority of science instructors and departments take this responsibility and how creatively they are prepared to explore further enhancements to what is already an admirable curriculum.

IV. Evaluating the Laboratory Requirement

To take on the most pressing issue first, the Committee has examined the question of whether the temporary suspension of the 2-lab requirement should be made permanent or allowed to lapse. We offer three perspectives drawn from (A) the chairs' responses, (B) empty seats available, and (C) actual enrollments versus expected audience.

A. The Chairs' Perspective

Thirteen department chairs from LS and PS, including the Institute of the Environment and Sustainability and the Institute for Society and Genetics, responded to the question posed by the FEC and UgC of whether they consider the current 2-lab requirement appropriate.[1] As we interpret these responses, **seven** chairs favor the current requirement, including one neutral response from a department that does not contribute to courses for non-BS major; **four** would favor return if resources allowed; and **two** favor continued suspension. Thus there exists among the chairs an overwhelming preference for reinstating the 2-lab requirement if feasible.

Expressed motivations for this preference are interesting. Although responses are quite diverse, two themes seem to stand out. The first concerns the importance of students learning to appreciate the unique character of scientific practice. As one respondent put it, "In a world free of resource constraints, every science course should have a hands-on lab component, in which students discover concepts and test hypotheses in the manner that natural scientists do in their daily work." We will reinforce this perspective in our proposal for revised laboratory criteria in Section VII below. A second theme concerns the enormous significance of science in contemporary culture. As another chair observed, "the increasing technological complexity of the modern world, as well as the related phenomenon of science-denial, make the creation of an educated mind, capable of critical thinking about science, yet more urgent." Again, the Committee fully supports this view and would like to amplify it.

With these considerations in mind, it is gratifying to see that in response to the question of how their department will participate in the GE curriculum during 2013-14, a variety of new laboratory courses or new laboratory credits were proposed, which we collect here along with the approximate number of students who would benefit.

• LS 15—Life: Concepts and Issues	650 students/yr
• PSYCH 15—Introductory Psychobiology	600
• EEB 17—Evolution for Everyone	100 [?]
• EEB 18—Why Ecology Matters	100 [?]

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[1] Note that these responses do not come from all departments offering courses that carry LS or PS credit (see Section V below).

- E&SS 17—Dinosaurs 400

This indicates that an additional laboratory capacity of **1800 students per year** is already being planned.

B. The "Empty-Seats" Perspective

The question remains, even with these additions, of whether sufficient laboratory capacity will exist to return to the 2-lab requirement. The most direct way to evaluate this question is simply to look at spare capacity in existing courses that carry laboratory credit. Table 1 provides a summary of yearly data from the Registrar's records from 2011-12 back to 2005-06. (See Appendix D for the data on individual courses.) For context, the first few columns give for each year the number of graduates from UCLA, number of incoming freshman, total undergraduate enrollment, and non-transfer enrollment. Because transfer students should have completed their GE requirements before transferring to UCLA, and because BS majors will satisfy their FSI GE requirements as part of their major, the column labeled "Non-transfer Non-BS," can be considered as the reference group for this analysis, or the "expected audience."[2] Successive columns then show:

- actual week-three enrollment in relevant courses carrying laboratory credit[3] (including BS as well as non-BS majors to obtain total seats, broken down by course credit attribution (LS, LS or PS, and PS);
- course capacity;
- spare capacity, obtained by subtraction;
- and non-BS enrollment.

Thus the most directly relevant numbers are those in the last two columns, which show the "empty seats" in relation to the total seats occupied by non-BS majors.

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[2] One group included in this expected audience, most of whom will not need non-BS major courses, are those pre-medical students who are BA majors. Like the BS majors, these students will also satisfy their FSI GE requirements through the courses they take as preparation for medical school (e.g., Chemistry and Physics). Therefore we are over-estimating the audience to some degree.

[3] "Relevant" here excludes GE FSI courses designed for BS-major preparation: the CHEM 14 & 20 series, LIFESCI 1 & 2, PHYSICS 1 & 6 series, and STATS 13. It should be noted, however, that about 25% of the enrollment in LIFESCI 1 are non-BS majors, although many of these are probably pre-medical students who take the course as part of their medical school preparation.

Table 1: Summary of Yearly Lab/Demo Enrollment Data

School Year	Grads	Incoming Freshmen	Total Undergrad Enrollment	Total Non-transfer Undergrad Enroll	Total Non-transfer Non-BS		Wk 3 Enrol#	Real Cap #	Spare Capacity	Non-BS
11-12	**7353**	**5824**	**26242**	**19285**	**10317**	**Total Lab**	**8254**	**10059**	**1805**	**5160**
						LS	4075	4610	535	1888
						LS or PS	1870	2192	322	1419
						PS	2309	3257	948	1853
10-11	**7503**	**4636**	**25124**	**17894**	**10032**	**Total Lab**	**7673**	**8854**	**1181**	**4952**
						LS	3215	3507	292	1559
						LS or PS	1938	2086	148	1468
						PS	2520	3261	741	1925
09-10	**7518**	**4472**	**25611**	**18291**	**10772**	**Total Lab**	**8341**	**9399**	**1058**	**5696**
						LS	3793	4057	264	2113
						LS or PS	1860	1936	76	1439
						PS	2688	3406	718	2144
08-09	**7193**	**4753**	**25655**	**18272**	**11059**	**Total Lab**	**8520**	**9826**	**1306**	**5699**
						LS	4087	4463	376	2107
						LS or PS	1777	1862	85	1434
						PS	2656	3501	845	2158
07-08	**7083**	**4564**	**25023**	**17601**	**10541**	**Total Lab**	**8145**	**9656**	**1511**	**5630**
						LS	4123	4508	385	2295
						LS or PS	1566	1672	106	1296
						PS	2456	3476	1020	2039
06-07	**6985**	**4809**	**24522**	**17352**	**10027**	**Total Lab**	**8909**	**10949**	**2040**	**6898**
						LS	4408	4995	587	2942
						LS or PS	1635	1745	110	1392
						PS	2866	4209	1343	2564
05-06	**7114**	**4422**	**23875**	**16831**	**9686**	**Total Lab**	**8759**	**10386**	**1627**	**6719**
						LS	4541	4942	401	2962
						LS or PS	1261	1273	12	1092
						PS	2957	4171	1214	2665

Looking down the columns of this summary chart, two results immediately stand out. First is the relative stability in the number of non-BS students enrolled in laboratory courses, especially over the last five years, despite the suspension of the 2nd lab requirement in 2010. This quite surprising result suggests that letting the suspension lapse would have minimal effect on laboratory enrollment. Second is the considerable spare capacity, varying between 961 and 1595 empty seats, or between 18% of the non-BS enrollment in 2009-10 and 33% in 2011-12. So the stability of enrollment over the suspension is buffered by a reservoir of spare capacity. In fact, combining the average spare capacity of 1300 with the planned additional 1800 from the chairs' responses above, would give 3100 extra seats, or almost two-thirds of what would be required even if the non-BS enrollments were doubled, which the stability of enrollments before and after the suspension shows to be highly unlikely.

It should be noted that even this optimistic scenario may not be optimistic enough. Departments sometimes adjust the number of sections in their courses to more nearly agree with the number of students who have enrolled. These adjustments reduce the numbers in the spare capacity column, although we cannot tell by how much. Similarly, there has been talk of making LS 1 more friendly for non-BS majors, which could significantly increase capacity. For reasons like these, a somewhat different, and broader perspective is useful.

C. The "Expected-Audience" Perspective

To introduce this broader perspective, Figure 1 plots the "expected audience" of non-transfer, non-BS students as defined above in comparison with the actual enrollment in all non-BS major courses (both lecture and laboratory courses). Since, on average, the expected audience should have been taking one FSI course per year, a direct comparison of the plots is appropriate. This yields another surprise. *The actual enrollment" has exceeded the expected audience by a factor of about 50%*.

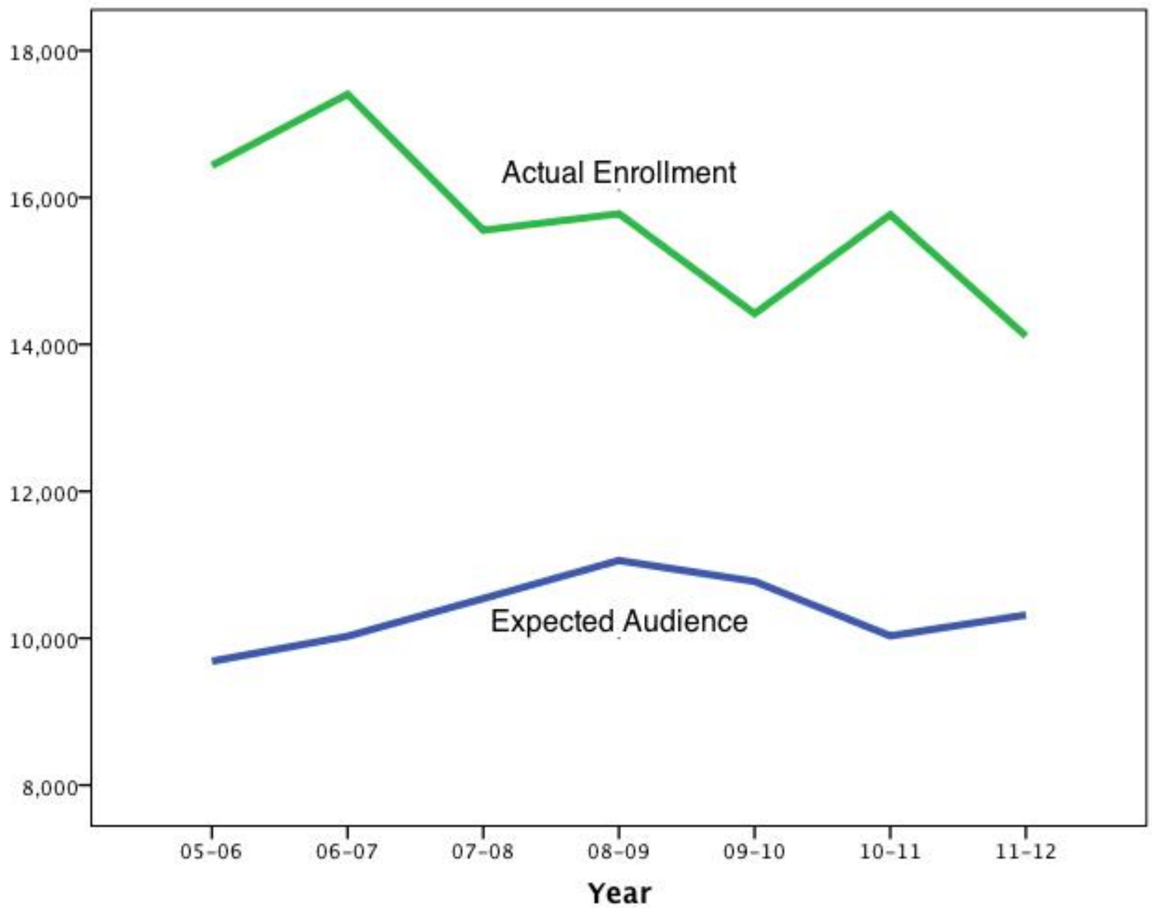

Figure 1. Comparison of the actual enrollment in non-BS major FSI courses (black line) with the "expected audience" for these courses (blue line), which is the total number of non-transfer, non-BS students across the university.

One can speculate on the reasons for this over-enrollment. One factor may be students who switch majors. Another may be students taking minors in FSI subjects which require particular GE courses. A third may be the addition of summer school to the enrollment numbers. In the summers there are a large number of non-UCLA students who take courses at UCLA, and these would be included in the enrollment numbers. Fourthly, many students who have completed all their major and GE requirements do not yet meet the minimum credit count to graduate, so they may take courses to fill their credit requirement. This suggests the most attractive possibility, that students may be taking FSI GE courses simply out of interest. Indeed, anecdotal evidence for some courses (e.g., Dinosaurs, E&SS 17) shows that a significant percentage of students are there just because they want to explore the topic.

To develop the broader perspective a bit further, we can break down the actual enrollment into the sub-areas of Physical and Life Sciences, both for all courses (Figure 2A) and for laboratory courses alone (Figure 2B), once again comparing the curves with expected audience. For all courses (Figure 2A) it is appropriate to divide the full, expected audience of non-transfer, non-BS students by two, since on average they will take a course within each sub-area every other year. For labs (Figure 2B), we divide the same audience by four, since they are only required to take one lab course in each sub-area during their entire 4-year tenure at UCLA. For all courses (Figure 2A), LS shows a somewhat higher overhead than PS (60% vs. 50%) but both are fairly stable until PS takes a dip in 2011-12 (unexplained). The situation is reversed for laboratory courses (Figure 2B) with PS showing an overhead of about 35% and LS about 25%. Also we see again that, although the laboratory suspension in 2010 apparently produced an immediate drop in LS lab enrollments of about 15%, they recovered in the next year (again unexplained).

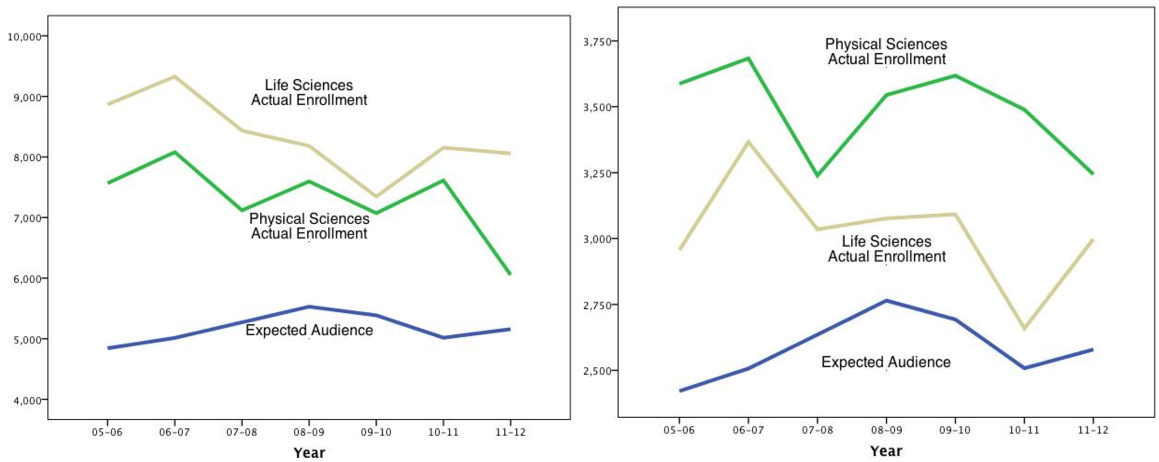

Figure 2. Comparison of actual enrollments for LS (yellow line) and PS (green line) with expected audience (blue line). Figure 2A is for all courses (lecture and lab) and Figure 2B for laboratory courses. For Figure 2A the "expected audience" from Figure 1 is divided by 2 and for Figure 2B it is divided by 4 (see text).

Thus we conclude again from this broader perspective on actual enrollments vs. expected audience that the suspension of the 2nd lab requirement in 2010 did not strongly affect enrollment patterns. The relative stability, even when student numbers across the university have been increasing, may be partly explained by Figure 3, which compares the total number of BS to non-BS students enrolled in all FSI courses (not just non-BS major courses) over time (and also showing the increase in total undergraduate enrollment). More students than ever are choosing BS degrees, and it seems that this sustained trend will continue. The rise may also be driven by the increase in transfer students accepted at UCLA, the majority of whom choose BS majors, although most of these students should have completed their GE requirements.

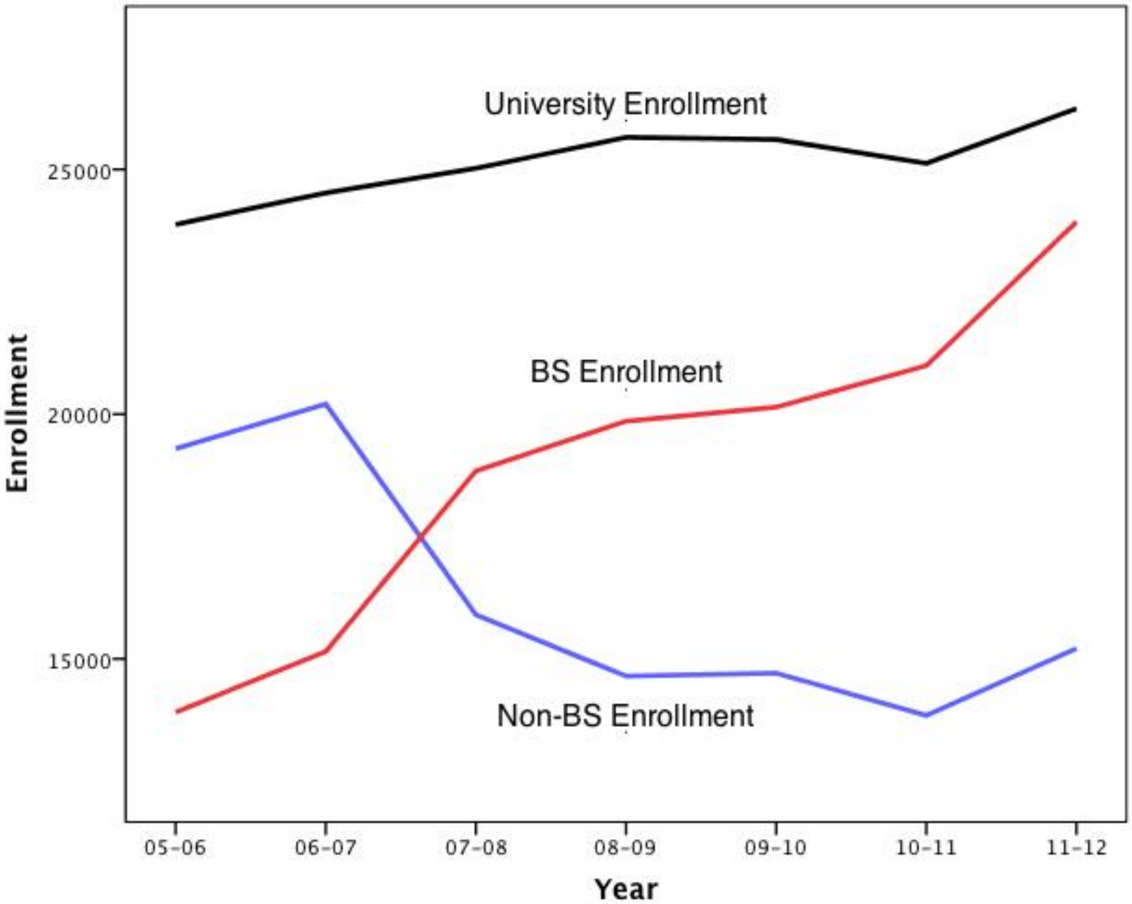

Figure 3. Total university undergraduate enrollment (black line), total enrollment by BS majors in all FSI courses (red line) and total enrollment by non-BS majors in all FSI courses (blue line).

V. Distributions of Courses across Departments, Students across Courses, and Faculty Engagement

A. Courses across Departments

With the capacity question largely resolved, our second major concern has been with the variety of courses available for non-BS majors and their distribution across departments. Of course one of the goals of General Education is to provide opportunities for students to increase the breadth of their knowledge so that they can better understand and contribute to a diversity of complex issues as they move forward in life. Table 2 summarizes departmental participation by year since 2005-06, giving both the number of different courses offered by each department, indicating variety, and the total number of offerings of those courses. Also shown specifically are the offerings for non-BS courses and for courses carrying laboratory credit. A non-BS course here refers to one in which over 50% of the students are non-BS majors. The break at 50% is somewhat arbitrary, but in the majority of cases the actual splits are closer to 80:20, so that the breakpoint does not significantly affect the results.

The results may be thought of on a scale of departmental participation. At one end of the scale are departments that offer a considerable variety of non-BS major courses, often with laboratory credit. Into this category go A&OS, E&SS, Astronomy (sharing a department with Physics), MCDB, Geography (in the Social Sciences Division), and to some extent Physiological Sciences. We note, however, that while Physiological Sciences offers three different courses, the PHY SCI 5 course (discussed below) is so large that it dwarfs enrollment in the others. We note too that, aside from Physiological Sciences, the departments offering a variety of non-BS courses are small departments, with relatively few majors and no significant requirement to teach BS majors from other departments. Their 'bread-and-butter' is teaching FSI GE courses.

In an intermediate position with respect to participation are departments like Psychology, MIMG, and EEB, which have had few GE FSI offerings, but which cover fields that lend themselves to engaging non-BS majors. Psychology in particular is a large department that provides little preparatory training to other BS majors and offers only one course for non-BS majors (PSYCH 15). The Committee is pleased to see that Psychology intends to add a laboratory component to PSYCH 15. We would encourage them and other departments like MIMG to offer additional courses for a general audience. Such courses would likely be quite popular and would add variety to undergraduates satisfying their life science requirements.

At the other end of the participation scale are those departments that provide many courses for BS-major preparation but neglect other students. Examples are Chemistry, the Life Sciences Core, and Physics, where courses such as LS1, LS2, Chem 14, Chem 20, Physics 1, and Physics 6 serve thousands of BS majors each year, but where few courses serve non-BS majors. Chemistry in particular, uniquely among departments, lacks any non-BS major course. (One such course, Chem 17, is listed in the catalog but is rarely taught.) Physics, in a sense, balances its offerings with the Astronomy courses in their joint department, and it does have one non-BS major course (Physics 10), but without a lab component. The Life Sciences Core is similar to Physics in that LS 1 and LS 2 dominate their lower division teaching responsibilities and occupy large amounts of lab space and FTE. Life Sciences faculty from the departments contributing to the LS Core, like EEB, do teach non-BS courses outside of the Core. Furthermore, several departments, as indicated in the Chairs' responses to the queries of the FEC and UgC, have been responding to the challenge and expect to add new courses in the coming year for non-BS students, not only the courses carrying laboratory credit noted above, but others as well, such as EEB 25 and Physics 11.

These laudable efforts are very much in line with the basic view of this Committee that the responsibility for educating non-BS students should be shared by all fields of the natural sciences, providing a minimum of one course each quarter for this broader audience. Quite specifically, we would encourage Chemistry to mount such courses, despite their heavy but quite separate commitment to the preparatory BS curriculum.

Table 2: Distribution of courses across departments (caption on following page)

Department	05-06				06-07				07-08				08-09			
	Courses	Offerings	Non-Major	Labs	Courses	Offerings	Non-Major	Labs	Courses	Offerings	Non-Major	Labs	Courses	Offerings	Non-Major	Labs
A&O SCI	3	10	10	10	3	11	11	11	3	12	12	12	3	11	11	11
ANTHRO	1	3	3	0	3	6	6	0	2	4	4	0	2	4	3	0
ASTR	4	9	9	4	4	10	10	4	4	11	11	3	4	9	9	3
C&EE																
CHEM	5**	14	2	8	5	13	1	8	4	12	0	8	4	12	0	8
E&S SCI	11	18	18	6	11	20	20	10	10	17	17	1	7	14	14	8
EE BIOL	1	1	1	0	2*	2	2	0	1	1	1	0	2*	2	2	0
ENVIRON																
GE CLST	8	8	8	5	9	9	9	5	7	7	7	4	6	6	6	4
GEOG	3	7	7	7	3	8	8	8	4	9	9	8	4	10	10	9
HNRS	4	4	4	1	3	3	3	0	4	4	4	1	4	4	4	1
HUM CS													1	2	2	0
LIFESCI	3	11	3	8	3	11	3	8	3	11	3	8	3	10	2	8
LING	1	4	4	0	1	4	4	0	1	4	4	0	1	4	4	0
MCD BIO	2	6	6	0	3	7	7	1	1	1	1	0	2	7	7	0
MIMG	2	4	4	0	2	5	5	0	1	1	1	0	1	2	2	0
NEUROSC	1	1	1	0	1	1	1	0	1	1	1	0	1	1	1	0
PHILOS	1	1	1	0	1	1	1	0	1	1	1	0	1	1	1	0
PHY SCI	3	6	6	6	3	6	6	6	3	6	6	6	3	6	6	6
PHYSICS	7	28	4	24	7	28	4	24	7	28	4	24	7	27	3	24
PSYCH	1	3	3	0	1	4	4	0	1	3	3	0	2*	3	3	0
SOC GEN									1	1	1	0	2	2	2	0
STATS	1	3	3	0	1	4	4	0	2	8	4	4	3*	9	5	5

Table 2 (cont.): Distribution of courses across departments

Department	09-10				10-11				11-12			
	Courses	Offerings	Non-Major	Labs	Courses	Offerings	Non-Major	Labs	Courses	Offerings	Non-Major	Labs
A&O SCI	3	12	12	12	3	11	11	11	3	9	9	9
ANTHRO	1	2	2	0	1	3	3	0	1	3	3	0
ASTR	4	9	9	3	3	9	9	3	6	10	10	3
C&EE									1	1	1	0
CHEM	4	12	0	7	4	11	0	7	4	11	0	7
E&S SCI	11*	18	18	8	12	20	20	7	10	20	20	10
EE BIOL	1	1	1	0	1*	1	1	1	2	3	3	0
ENVIRON	1	1	1	0	1	1	1	0	1	1	1	0
GE CLST	7	7	7	4	10	10	10	4	10	10	10	4
GEOG	4	10	10	10	4	11	11	11	4	11	11	11
HNRS	3	3	3	1	4	4	4	1	4	4	4	1
HUM CS	1	2	2	0	1	3	3	0	1	1	1	0
LIFESCI	3	10	2	8	3	10	2	8	3	11	3	4
LING	1	4	4	0	1	4	4	0	1	4	4	0
MCD BIO	2	7	7	7	3*	6	6	0	3	7	7	1
MIMG	1	1	1	0	1	2	2	0	2*	2	2	1
NEUROSC	1	1	1	0	1	1	1	0	1	1	1	0
PHILOS	1	1	1	0	1	1	1	0	1	1	1	0
PHY SCI	3	5	5	5	3	5	5	5	4	7	7	7
PHYSICS	7	27	3	24	7	27	3	24	9	27	3	24
PSYCH	2*	3	3	0	2*	3	3	0	1	4	4	0
SOC GEN	2	2	2	0	3	3	3	0	3	4	4	0
STATS	3*	9	5	4	2	8	4	4	2	8	4	4

Courses = Number of different course numbers offered in a given year (honors sections not counted separately).
*** denotes this number includes a CUTF 98T course (taught by graduate students and meant as "one-off" courses which do not become part of the ongoing curriculum of a department. CHEM offered two 98T courses in 05-06.**
If a department's sole contribution to FSI GEs was CUTF offerings, it was excluded from the table; this includes AP LING (08-09), BIOMATH (06-07), DIS STD (10-11) and MATH (07-08 &11-12).
Offerings = Number of total offerings of all FSI courses combined
Non-Major = Number of non-BS major offerings. Excludes all BS prep courses: CHEM 14 & 20 series, LIFESCI 1&2, PHYSICS 1 & 6 series, STATS 13
Labs = Number of offerings (BS major and non-BS major courses) carrying a lab credit. Laboratory offerings are not counted toward the total number of courses or offerings, but are counted in the total number of lab offerings.

B. Students across Courses

Another way to look at the course data is to focus on the variety of courses that non-BS students are actually taking. To evaluate this goal, we have investigated enrollment trends in those specific courses that account for the majority of students. Table 3 lists the most highly enrolled ("most popular") non-BS major courses by academic year and type of credit, PS or LS. For courses *without* laboratory credit, the most popular six courses are shown; for classes *with* laboratory credit, typically only the five most popular courses are listed. Successive columns give the number of students enrolled at week 3 and the percentage of total enrollment in the relevant credit area. A cumulative percentage for the courses listed is shown at the top of the percentage column for each area. The result is striking. In nearly every case these five or six most popular courses account for 2/3 or more of all students enrolled. For LS laboratory courses it is about 90%. By any measure, those are disappointing numbers for the variety of courses students are taking.

Figure 4 plots the percentages more specifically for the three most popular laboratory courses in PS and LS. One might already be concerned to see that one course (ASTRO 3, Nature of the Universe) accounts for over 25% of the PS enrollments. But for LS the percentage is nearly 50% for a single course (PHY SCI 5, Human Physiology – Diet and Exercise). Furthermore, the 2nd and 3rd most popular courses carrying LS laboratory credit are offered outside LS departments: E&SS 15, Blue Planet – Introduction to Oceanography; GEOG 5, People and Earth's Ecosystem. Overall, about 60% of all enrollments for non-laboratory LS credit are in courses from the Social Sciences (ANTHRO, GEOG), Humanities (LING, PHIL), and Physical Sciences (STATS). Similarly, 40-50% of enrollments for laboratory LS credit come from courses outside LS (GEOG, E&SS, GE CLST). The comparable numbers for PS are much smaller, less than 10% for non-laboratory courses and about 20% for laboratory courses.

A number of responses to these data are relevant. Most obviously from the point of view of intellectual diversity, far too many students are satisfying their LS laboratory requirement with a single course, PHY SCI 5. Bluntly stated, if half of all UCLA students are satisfying this requirement with a single course on nutrition and exercise, then a major opportunity for General Education is being squandered, independent of the quality of that course. To address the issue, LS departments should be offering a greater variety of courses that appeal to non-BS students. As observed above (Section IV), we are very encouraged to see that major steps in this direction are already underway that may accommodate an additional 1800 students. With respect to PS laboratory enrollments, although one course still carries one fourth of the students, the distribution across courses is considerably more even. It could be better, however, with more participation from the large departments of Chemistry and Physics especially.

Table 3: Enrollment in the most popular non-BS major FSI GE courses (caption on following page)

2005-06				
PS no Lab			3892	71%
A&O SCI	2	AIR POLLUTION	842	22%
A&O SCI	3	INTR-ATMOS ENVIRMNT	547	14%
PHYSICS	10	PHYSICS	481	12%
STATS	10	INTRO-STAT REASON	423	11%
A&O SCI	1	CLIMATE CHANGE	253	7%
E&S SCI	9	SOLAR SYSTM&PLANETS	219	6%
LS no Lab			5640	71%
LING	1	INTR-STUDY-LANGUAGE	1046	19%
MCD BIO	40	AIDS&SEXUAL TRANSMT	795	14%
ANTHRO	7	HUMAN EVOLUTION	663	12%
LIFESCI	15	LIFE-CONCPTS&ISSUES	567	10%
PSYCH	15	INTRO PSYCHOBIOLOGY	469	8%
GE CLST	80	FRONTRS-HUMAN AGING	468	8%
PS Lab			3599	88%
ASTR	3	NATURE OF UNIVERSE	1177	33%
E&S SCI	15	INTROD-OCEANOGRAPHY	772	21%
E&S SCI	8	EARTHQUAKES	572	16%
GEOG	5	PEOPLE&EARTH ECOSYS	398	11%
GE CLST	M1	GLOBAL ENVIRON-TPCS	254	7%
LS Lab			3036	97%
PHY SCI	5	HMN PHYS-DIET&EXRCS	1306	43%
E&S SCI	15	INTROD-OCEANOGRAPHY	772	25%
GEOG	5	PEOPLE&EARTH ECOSYS	398	13%
GE CLST	M1	GLOBAL ENVIRON-TPCS	254	8%
GE CLST	70	COSMOS AND LIFE	208	7%

2006-07				
PS no Lab			3786	60%
STATS	10	INTRO-STAT REASON	452	12%
A&O SCI	2	AIR POLLUTION	640	17%
A&O SCI	3	INTR-ATMOS ENVIRMNT	437	12%
PHYSICS	10	PHYSICS	277	7%
E&S SCI	9	SOLAR SYSTM&PLANETS	238	6%
A&O SCI	1	CLIMATE CHANGE	235	6%
LS no Lab			5773	66%
LING	1	INTR-STUDY-LANGUAGE	1132	20%
ANTHRO	7	HUMAN EVOLUTION	696	12%
GE CLST	72	SEX-BIOLOGY-SOCIETY	544	9%
LIFESCI	15	LIFE-CONCPTS&ISSUES	505	9%
GE CLST	80	FRONTRS-HUMAN AGING	472	8%
STATS	10	INTRO-STAT REASON	451	8%
PS Lab			4386	67%
ASTR	3	NATURE OF UNIVERSE	1134	26%
E&S SCI	8	EARTHQUAKES	534	12%
E&S SCI	15	INTROD-OCEANOGRAPHY	524	12%
A&O SCI	2L	AIR POLLUTION LAB	310	5%
GE CLST	M1	GLOBAL ENVIRON-TPCS	259	6%
GEOG	5	PEOPLE&EARTH ECOSYS	252	6%
LS Lab			3995	63%
PHY SCI	5	HMN PHYS-DIET&EXRCS	1331	33%
E&S SCI	15	INTROD-OCEANOGRAPHY	523	13%
GEOG	5	PEOPLE&EARTH ECOSYS	252	6%
GE CLST	M1	GLOBAL ENVIRON-TPCS	259	6%
GE CLST	70	COSMOS AND LIFE	171	4%

2007-08				
PS no Lab			3532	76%
STATS	10	INTRO-STAT REASON	852	24%
A&O SCI	2	AIR POLLUTION	526	15%
A&O SCI	3	INTR-ATMOS ENVIRMNT	413	12%
PHYSICS	10	PHYSICS	353	10%
A&O SCI	1	CLIMATE CHANGE	301	9%
E&S SCI	9	SOLAR SYSTM&PLANETS	232	7%
LS no Lab			5412	73%
LING	1	INTR-STUDY-LANGUAGE	1127	21%
STATS	10	INTRO-STAT REASON	852	16%
ANTHRO	7	HUMAN EVOLUTION	635	12%
GE CLST	72	SEX-BIOLOGY-SOCIETY	477	9%
LIFESCI	15	LIFE-CONCPTS&ISSUES	443	8%
GE CLST	80	FRONTRS-HUMAN AGING	425	8%
PS Lab			3842	68%
ASTR	3	NATURE OF UNIVERSE	923	24%
E&S SCI	8	EARTHQUAKES	490	13%
GEOG	5	PEOPLE&EARTH ECOSYS	407	11%
E&S SCI	15	INTROD-OCEANOGRAPHY	344	9%
GE CLST	M1	GLOBAL ENVIRON-TPCS	235	6%
GE CLST	70	COSMOS AND LIFE	211	5%
LS Lab			2910	89%
PHY SCI	5	HMN PHYS-DIET&EXRCS	1349	46%
GEOG	5	PEOPLE&EARTH ECOSYS	407	14%
E&S SCI	15	INTROD-OCEANOGRAPHY	344	12%
GEOG	2	BIODIVR-CHNGNG WRLD	247	8%
GE CLST	M1	GLOBAL ENVIRON-TPCS	235	8%

2008-09				
PS no Lab			3643	72%
STATS	10	INTRO-STAT REASON	742	20%
A&O SCI	2	AIR POLLUTION	594	16%
A&O SCI	1	CLIMATE CHANGE	403	11%
A&O SCI	3	INTR-ATMOS ENVIRMNT	319	9%
PHILOS	8	INTRO-PHILOS OF SCI	318	9%
PHYSICS	10	PHYSICS	253	7%
LS no Lab			4813	74%
LING	1	INTR-STUDY-LANGUAGE	1063	22%
STATS	10	INTRO-STAT REASON	742	15%
ANTHRO	7	HUMAN EVOLUTION	664	14%
GE CLST	80	FRONTRS-HUMAN AGING	439	9%
MCD BIO	40	AIDS&SEXUAL TRANSMT	350	7%
MCD BIO	50	STEM CELL BIO&PLTCS	294	6%
PS Lab			3482	81%
ASTR	3	NATURE OF UNIVERSE	978	28%
E&S SCI	8	EARTHQUAKES	545	16%
GEOG	5	PEOPLE&EARTH ECOSYS	418	12%
E&S SCI	15	INTROD-OCEANOGRAPHY	403	12%
GE CLST	M1	GLOBAL ENVIRON-TPCS	235	7%
A&O SCI	2L	AIR POLLUTION LAB	226	6%
LS Lab			2896	91%
PHY SCI	5	HMN PHYS-DIET&EXRCS	1341	46%
GEOG	5	PEOPLE&EARTH ECOSYS	418	14%
E&S SCI	15	INTROD-OCEANOGRAPHY	403	14%
GE CLST	M1	GLOBAL ENVIRON-TPCS	235	8%
GE CLST	70	COSMOS AND LIFE	226	8%

Table 3 (cont.): Enrollment in the most popular non-BS major FSI GE courses

2009-10				
PS no Lab			2882	77%
STATS	10	INTRO-STAT REASON	699	24%
A&O SCI	2	AIR POLLUTION	388	13%
A&O SCI	3	INTR-ATMOS ENVIRMNT	388	13%
PHYSICS	10	PHYSICS	277	10%
PHILOS	8	INTRO-PHILOS OF SCI	238	8%
ASTR	4	BLACK HOLES	237	8%
LS no Lab			4910	67%
LING	1	INTR-STUDY-LANGUAGE	1052	21%
STATS	10	INTRO-STAT REASON	699	14%
GE CLST	72	SEX-BIOLOGY-SOCIETY	488	10%
GE CLST	80	FRONTRS-HUMAN AGING	419	9%
ANTHRO	7	HUMAN EVOLUTION	356	7%
MCD BIO	50	STEM CELL BIO&PLTCS	283	6%
PS Lab			3575	77%
ASTR	3	NATURE OF UNIVERSE	962	27%
E&S SCI	8	EARTHQUAKES	601	17%
GEOG	5	PEOPLE&EARTH ECOSYS	422	12%
E&S SCI	15	INTROD-OCEANOGRAPHY	329	9%
A&O SCI	2L	AIR POLLUTION LAB	232	6%
GE CLST	70	COSMOS AND LIFE	214	6%
LS Lab			2916	88%
PHY SCI	5	HMN PHYS-DIET&EXRCS	1415	49%
GEOG	5	PEOPLE&EARTH ECOSYS	421	14%
E&S SCI	15	INTROD-OCEANOGRAPHY	329	11%
GE CLST	70	COSMOS AND LIFE	232	8%
GEOG	2	BIODIVR-CHNGNG WRLD	180	6%

2010-11				
PS no Lab			3912	57%
STATS	10	INTRO-STAT REASON	715	18%
A&O SCI	3	INTR-ATMOS ENVIRMNT	512	13%
PHILOS	8	INTRO-PHILOS OF SCI	356	9%
PHYSICS	10	PHYSICS	291	7%
ASTR	4	BLACK HOLES	181	5%
ASTR	5	LIFE IN THE UNIVERS	180	5%
LS no Lab			5791	66%
LING	1	INTR-STUDY-LANGUAGE	1114	19%
STATS	10	INTRO-STAT REASON	715	12%
ANTHRO	7	HUMAN EVOLUTION	634	11%
GE CLST	72	SEX-BIOLOGY-SOCIETY	521	9%
LIFESCI	15	LIFE-CONCPTS&ISSUES	431	7%
GE CLST	80	FRONTRS-HUMAN AGING	382	7%
PS Lab			3257	74%
ASTR	3	NATURE OF UNIVERSE	997	31%
E&S SCI	8	EARTHQUAKES	505	16%
GEOG	5	PEOPLE&EARTH ECOSYS	412	13%
E&S SCI	15	INTROD-OCEANOGRAPHY	351	11%
A&O SCI	1L	CLIMATE CHANGE LAB	148	5%
LS Lab			2180	92%
PHY SCI	5	HMN PHYS-DIET&EXRCS	879	40%
GEOG	5	PEOPLE&EARTH ECOSYS	412	19%
E&S SCI	15	INTROD-OCEANOGRAPHY	350	16%
GEOG	2	BIODIVR-CHNGNG WRLD	146	7%
GE CLST	M1	GLOBAL ENVIRON-TPCS	220	10%

2011-12				
PS no Lab			4031	68%
STATS	10	INTRO-STAT REASON	1042	26%
A&O SCI	1	CLIMATE CHANGE	519	13%
A&O SCI	2	AIR POLLUTION	397	10%
PHYSICS	10	PHYSICS	279	7%
E&S SCI	9	SOLAR SYSTM&PLANETS	266	7%
ASTR	4	BLACK HOLES	236	6%
LS no Lab			6971	69%
LING	1	INTR-STUDY-LANGUAGE	1229	18%
STATS	10	INTRO-STAT REASON	1042	15%
LIFESCI	15	LIFE-CONCPTS&ISSUES	716	10%
ANTHRO	7	HUMAN EVOLUTION	690	10%
PSYCH	15	INTRO PSYCHOBIOLOGY	615	9%
GE CLST	72	SEX-BIOLOGY-SOCIETY	493	7%
PS Lab			3023	79%
ASTR	3	NATURE OF UNIVERSE	789	26%
E&S SCI	8	EARTHQUAKES	500	17%
GEOG	5	PEOPLE&EARTH ECOSYS	511	17%
E&S SCI	15	INTROD-OCEANOGRAPHY	177	6%
A&O SCI	1L	CLIMATE CHANGE LAB	228	8%
GE CLST	M1	GLOBAL ENVIRONMNT 1	192	6%
LS Lab			2549	90%
PHY SCI	5	HMN PHYS-DIET&EXRCS	1247	49%
GEOG	5	PEOPLE&EARTH ECOSYS	511	20%
E&S SCI	15	INTROD-OCEANOGRAPHY	177	7%
GEOG	7	GEOG INFO SYSTEMS	154	6%
GE CLST	M1	GLOBAL ENVIRON-TPCS	193	8%

Enrollment in the most popular non-BS major courses by year, and by credit area within each year (Life and Physical Sciences, both with and without lab). Table has course department, number, name, enrollment numbers, and percentage of enrollment in all non-BS major courses. For each credit area, the total enrollment for all the courses within the area and total percentage of enrollment represented by those courses.

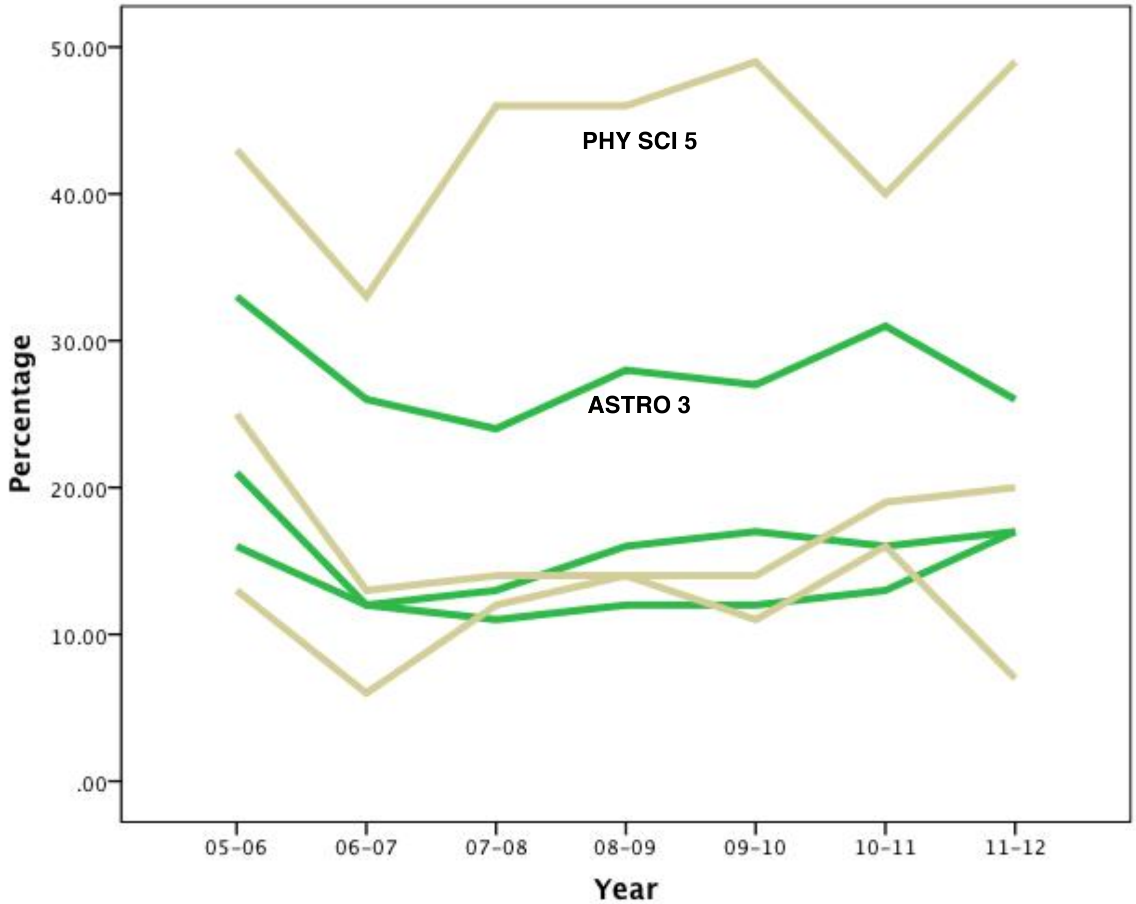

Figure 4. Percentage enrollment in the three most popular FSI non-BS major courses carrying PS (green lines) or LS (yellow lines) laboratory/demo credit.

Another concern about LS enrollments might be that too large a fraction of students are enrolled in courses from outside the LS Division. But this should be seen as a matter of there being too few appropriate LS courses rather than of non-LS departments contributing. In fact, the Committee regards the extension across Divisions as providing an excellent starting point for the kind of cross-disciplinary education that needs to be developed much further. Even more systematic precedents exist in the explicitly cross-disciplinary units housed in the PS and LS Divisions, the Institute of the Environment and Sustainability (PS) and the Institute for Society and Genetics (LS). (See Section VI below for the cross-disciplinary theme.)

Similarly, the importance of the clusters in helping non-BS majors fulfill their FSI GE requirements should be noted. Across the study period, clusters granted 7-11% per year of the non-BS major FSI GE credit. This makes their contribution as large, or larger, than some departments in the Life and Physical Science Divisions. Also, anecdotally, many students in the clusters get turned on to science majors, and provide a small, but steady influx of students into science departments. Further involvement in the clusters by science departments could be a way to increase their participation in the FSI GE curriculum.

One final remark on the distribution of students among courses is quite important. Many students elect their GE courses on the advice of College counselors. The counselors themselves, therefore, need to be enrolled in helping to make students aware of the full spectrum of courses available to them and in advising them to more adventurously explore courses other than currently dominant ones like PHY SCI 5 and ASTRO 3. No doubt this will require a considerable effort between departments and counselors in drawing out the significance of various courses. Such efforts, however, should be systematically pursued, including with counselors for Freshman Orientation, where students first encounter the GE curriculum. The counseling program should be coupled with an effective and up-to-date website for the FSI curriculum.

C. Faculty Engagement

Just as the participation of departments in the non-BS FSI curriculum is very uneven, so too is the participation of ladder faculty. Non-ladder faculty are an extremely important component of FSI instruction and often provide equal or even superior instruction, but it is nevertheless crucial to keep ladder faculty engaged. Our concern is that FSI instruction in some departments could come to be regarded largely as a burden for the faculty and as a quite secondary task of the department. Overall, approximately half of GE science courses are currently taught by ladder faculty, but that fraction varies from roughly 90% in Astronomy to less than 20% in Statistics, MCD Biology and Physiological Sciences. We note with some concern that PHY SCI 5 is never taught by a ladder faculty member and the lab component is done outside of class with little supervision (see Section VI below). Psych 15 is also not normally taught by a ladder faculty member, which is likely to keep it somewhat outside the normal departmental offerings.

A beginning model for maintaining the engagement of a department can be found with MCD Biology, where the vice chair of undergraduate education reviews all non-ladder faculty, including sitting in on a lecture. In addition, however, ladder faculty should be directly engaged with non-ladder faculty in course development. And equally, long-term non-ladder faculty should be involved in departmental governance with respect to curricular decisions.

VI. Expanded Conception of FSI GE Courses and Laboratories and Cross-Disciplinarity

A. Expanded Conception

As is apparent to all, the nature of much scientific work is changing as fast as the technologies it employs and helps to create. The so-called sciences of complexity have become a durable feature of the world. Cross-disciplinary research is blossoming everywhere, as are collaborations extending around the globe. Modeling, simulations, and data mining occupy increasing numbers of people. And many scientists obtain their data not from their own observations and experiments but from distant facilities. With this changing context in mind, the Committee would like to propose a modest revision of the original mission statement of FSI from 2002.

Mission Statement for FSI Courses

> *The aim of FSI Courses is to ensure that students gain a full appreciation of how scientists in different fields formulate and answer questions about the physical and biological worlds and of how complementary approaches can contribute to a richer understanding both of natural processes and of human involvement with them. These courses deal with some of the most fascinating issues in contemporary science: the origin and evolution of the universe and of this planet, with the life on it; environmental sustainability; genetic and epigenetic contributions to health and disease; the ecology of the oceans, and human interactions with the natural environment. Through lectures, laboratory experiences, writing, and intensive discussions students participate in exploring both present knowledge and its limitations. They grapple too with the ethical and social responsibilities that accompany scientific understanding. They should come away charged with the excitement of science.*

More concretely, the stress in FSI courses should be on how science actually gets done. In order to gain an appreciation of doing research, students should be presented with current methodologies, techniques, and literature in particular areas. They should learn how scientists think about evidence, uncertainty, and testing the limits of current theories. The goal is to learn how to evaluate information critically in a scientific context.

The same concern with the changing character of much scientific work leads us also to suggest an expanded conception of what constitutes a laboratory course for FSI credit. This expanded conception may also contribute to relieving whatever uneasiness may still remain about limited laboratory capacity inhibiting a return to the 2-lab requirement. We propose the following statement.

Defining the Lab Component for FSI

> *A working familiarity with the practices underpinning scientific knowledge is an indispensible part of a liberal arts education. The rapidly increasing technological complexity of life in the modern world makes the development of critical minds,*

capable of analytic reflection on scientific results, all the more urgent. Integral to this process is the trial-and-error exploration of phenomena in laboratory contexts, where materials, instruments, modes of thought, and mathematical techniques come into play in concrete situations.

As a basic principle, laboratory courses satisfying the FSI GE requirement should mirror at the student level what working scientists actually do in their own work. Thus laboratories will look quite different in different areas, say Statistics vs. Biology or Psychology vs. Physics. The key idea underlying the laboratory requirement, however, is hands-on engagement, whether through observation, experiment, data analysis, fieldwork, modeling, or simulation. Course offerings should strive to incorporate a sense of discovery, to make the material more relevant, the learning more active, and the ultimate understanding more effective and complete.

Laboratory courses should address scientific methods as much as concepts and principles. They should put the stress on inquiry, on the diversity of things and processes in the world and how to find out about them. This will involve the presentation, analysis, and interpretation of data, along with the articulation and refinement of hypotheses and conclusions. More specifically, across the weeks of the quarter laboratory courses should include: 1) the development of testable hypotheses, 2) the design of methods by which students can collect relevant data, 3) written and/or oral presentations of results, analyses, and interpretations, and 4) discussion of the uncertainties associated with students' results and how they can constrain the conclusions that they are able to draw from their work.

Group work on laboratory assignments is often required by resource limitation, and can itself be a beneficial aspect of an educational experience, but effort should be made to limit group size to a maximum of about four and to identify the contributions of individual students to group assignments. Group assignments may also be balanced with individual assignments within a course.

To encompass the diversity of the natural sciences a broad interpretation of the term 'laboratory' is required, including traditional wet laboratories but also field explorations, statistical and computational analysis of existing data sets in a new way, experience with modeling and model systems, computer-based simulations, and online interactive experiments and analyses. The cross-disciplinary character of much contemporary science suggests, furthermore, that different kinds of laboratory work might well be included in a single course, stressing the multiplicity of techniques required to address many real-world issues. This multiplicity might well include (though not exclusively) such things as disciplined library research AND the critical decomposition of a research article or lecture AND a computer simulated discovery-based laboratory assignment AND/OR a hypothesis-driven wet lab OR field work.

As the final paragraph indicates, the Committee believes that innovative laboratories of many different kinds could greatly enhance the FSI laboratory experience. We would like to see a great deal more experimentation in this area, which could by itself, in the pursuit of creative questions and answers, help to make laboratory work interesting and attractive.

B. Cross-Disciplinarity

The issue of cross-disciplinary courses deserves special comment: first, because so many critical societal issues for students of this generation (e.g. climate change, global health) are inherently cross-disciplinary, and second, because such courses better reflect current practices and future directions of science. In its 2013 report, a blue ribbon committee of the American Academy of Arts and Sciences (ARISE 2) repeatedly stressed that the number one goal for American science should be transdisciplinary research, "so that the tools and expertise developed within discrete disciplines are shared and combined to enable a deep conceptual and functional integration across the disciplines" (p. 18). Integration is the pressing need.

An FSI course may be cross-disciplinary for a number of reasons: 1) it may bridge north and south campus aspects of a topic, as is the case for several GE cluster courses; 2) it may interrelate a broad set of issues within one division; 3) it may focus on a particular problem or case which necessarily invokes evidence and argument from several disciplines. Such courses may be particularly attractive because they focus on complex societal issues (**climate change and politics** in AOS 1; **AIDS and human behavior** in MCDB 40; **stem cell medical use and politics** in MCDB 50; **American obesity and diabetes** in SocGen 5); or because the topic is inherently "cool" (**dinosaurs**, in ESS17; **sex**, in the GE Cluster 72); or because there is a potential immediate lifestyle or health benefit to learning about the topic (**diet and exercise**, in PhySci 5).

The opportunity to engage UCLA students (whether BS or non-BS) in science and societal issues at UCLA has only begun to be tapped, whether with regard to key social issues with strong scientific underpinnings or to transformative methods that have rapidly become standard in the natural sciences. Many departments that actively pursue these issues and techniques do not offer FSI courses covering them. Thus, once again, we would like to reinforce the many voices calling for greater attention to cross-disciplinarity in education as well as research, whether through new courses or renovation of existing courses to reflect recent developments. It is particularly important to bring in fresh perspectives or critiques from across disciplines so that students do not interpret science narrowly as one solution to one problem.

An example of a relatively new GE course (GE credit available through either Life Sciences or Social Sciences) that strives to approach problem-solving from a cross-disciplinary perspective is SocGen 5: Integrative Approaches to Human Biology and Society. It focuses on two particular issues that require both scientific and social analysis: (1) diabetes and obesity; (2) antibiotic resistance. The course states as its aim: "to teach students how we know what we know in relation to real-world problems. Students will engage with current research in microbiology, chronic disease etiology, developmental biology, science and technology studies, history of science, and medical anthropology … and [will be] challenged to think through the commensurability and gaps between these different modes of scientific and humanistic inquiry." We encourage development of other courses in this spirit of cross-disciplinary inquiry and criticism.

VII. Course Syllabi, Grading, and Student Evaluations

A. Syllabi

The Committee decided not to do an extended evaluation of FSI courses, believing instead that the GE Governance Committee should establish a systematic process of course review, as has been recommended previously, perhaps on a rotating basis, with 1/5 of the courses evaluated every year. Nevertheless, in order to get a sense of what a student could learn about the content and quality of non-BS courses from a close look at their syllabi, a sub-group of the Committee examined the recent syllabi of six high-enrollment courses that satisfy the FSI requirement. They are Anthropology 7, Astronomy 3, Physiological Sciences 5, Earth and Space Sciences 15, Geography 5, and Linguistics 1. (Note that Anthropology, Geography, and Linguistics, fall outside the Divisions of Life Science and Physical Science.)

From such courses students should gain an appreciation of processes of scientific investigation and of how different questions are approached by different disciplines. Course syllabi were therefore evaluated based on the three following questions, with the results shown in the accompanying table:

1. Does the course description provide information about how it fulfills the FSI requirement?
2. Does it indicate that students are engaged in investigative activities in the lab/discussion sections?
3. Is the material presented in such a way as to establish relevance with other aspects of everyday life?

	ANTHRO 7	ASTRO 3	PHY SCI 5	E&SS 15	GEOG 5	LING1
1	Yes	No	No	No	No	Yes
2	discussion	?	?/Yes	?/Yes	Yes	discussion
3	Yes	Yes	Yes	No	Yes	Yes

We are confident from anecdotal information that all of these courses serve well the goals of FSI. But for a student seeking to evaluate them on the basis of their syllabi, the picture is not satisfactory. Overall, the syllabi do convey the relevance of the course to a student's everyday life. And all but one syllabus includes some brief discussion of topic coverage, either listed in the lecture topics or in an opening paragraph on "Course Description." But they generally lack any deeper presentation of concepts and learning goals, attending instead only to course logistics. Crucially, many of the syllabi were not publicly available, which violates a requirement for all GE courses and makes them useless for students selecting courses.

It would be valuable also for course syllabi to have more information on lab/discussion content and methods of investigation, such as systematic observation, hypothesis formulation, and data analysis. It seems likely that these methods are actually prominent in the courses but a more straightforward presentation with a clear schedule of labs/discussions would be helpful. The syllabus for ASTRO 3 states that discussion = lab in the syllabus, and mentions that experiments are done in the lab section, but no description or topic for each week is included. E&SS 15 has labs clearly outlined for each week, but the content is unclear. PHY SCI 5 gives brief descriptions of topics and data to be collected each week, but this seems to be on an individual basis with comparisons perhaps being made in section with other class members. Other syllabi state the role of required labs for the course, but do not describe the activities or discuss their significance. Some courses, such as GEOG 5, are clearly using a mixture of assignments and activities to illustrate scientific processes, and they require student involvement in projects that relate directly to course content. This provides a good example of overall course content for non-BS majors who want to participate in the life of science.

Finally, because PHY SCI 5 came under critical scrutiny in the previous review, particularly with respect to its lab/discussion component, we are pleased to see that its structure has been changed to include discussion of the take-home labs required in the course. Still, two issues remain. First, the discussion sections are said to be there for review of lecture content and not solely for engaging with the laboratory experience. Second, there are 14 sections with only one TA. Our concern is that the enrollments are so high that proper discussion and evaluation of lab assignments may be difficult for a single TA to accomplish.

B. Grading

Since grading is a major concern for prospective students, as well as an indicator of course rigor, we have examined grade distributions for each of the six courses, as indicated in Figure 5. The distributions are rather similar, with a minimum of 70% of students receiving A’s and B’s. This is rather higher than recommended in the faculty guidelines (as given by suggested grades in the Gradebook application). The Committee was not overly concerned about this, since students are there to gain an appreciation of science and not to compete in a “weeding” process for majors. Nevertheless, critical evaluation of knowledge, including one’s own, is also a goal of learning. We recommend that faculty adhere more closely to University policy on grade distributions.

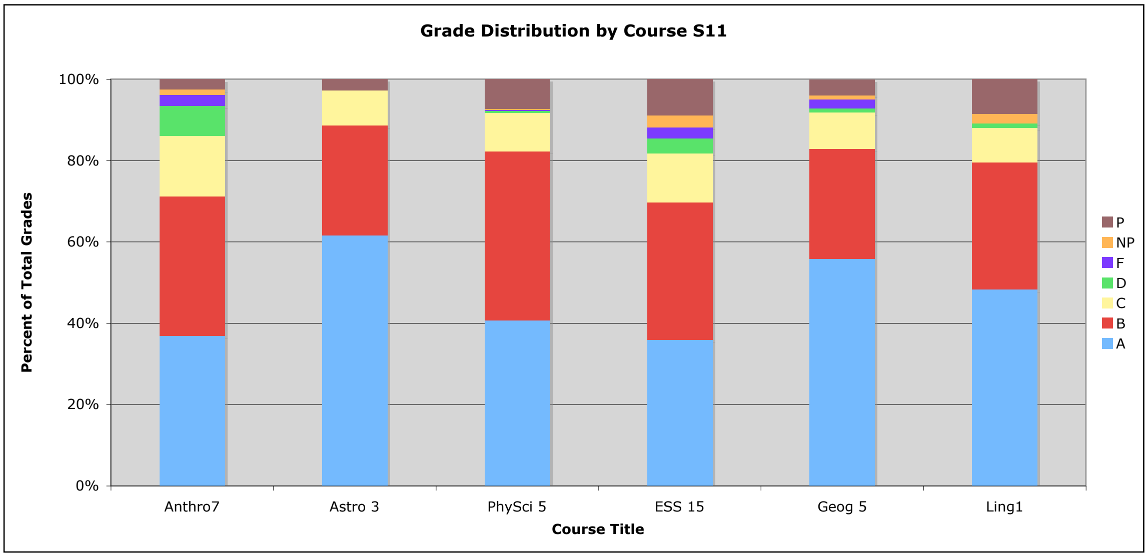

Figure 5: Grade Distributions by course for Spring 2011. Information comes from the registrar's office on actual grades that were granted in the courses.

C. Student Evaluations

In order to assess FSI GE courses in the future, it would be helpful to have a few prompts added to the end-of-quarter course evaluations that are designed especially to address the goals of these courses. With the advent of online evaluation, this should be relatively straightforward. We suggest the following three prompts be added to the form for all FSI GE courses:

- The course improved your understanding of how scientists formulate and answer questions.
- The course addressed important issues, developments, and methodologies in contemporary science.
- The course explored relationships between scientific inquiry and society.

VIII. Summary and Recommendations

Extended discussions and analysis by the Self-Review Committee have produced enormous respect for the commitment of the many people who supply the rich content of the FSI GE curriculum. It is outstanding. Of course there are areas in which improvements could be made. Focusing on these areas, we offer the following summary of our recommendations, organized according to the sections of the Report above that have motivated them.

Section IV. Laboratory Requirement

- The two-laboratory requirement for FSI GE should be fully restored (i.e., the temporary suspension should simply expire). Three different ways of looking at present conditions—department chairs' evaluations; empty seats; enrollment vs. expected audience—conspire together to argue that restoring the requirement will present no serious burden for either departments or students. Plenty of capacity exists for maintaining the irreplaceable role of laboratory experiences in General Education.

Section V. Course Diversity and Distribution

- Although considerable diversity exists in the courses available to non-BS students for FSI credit in both PS and LS, the courses are unevenly distributed across departments and there are large holes in the spectrum. To put a sharp point on the issue: a bright young non-BS student at UCLA who would like to explore the exciting developments taking place in any area of Chemistry would find not a single course on offer and no plans for establishing one, not even a non-laboratory course. In all of Psychology they would find one course (now adding a laboratory) and in Physics one course (increasing to two in the coming year). We very much appreciate the commitment of Chemistry and Physics to providing pre-major BS courses, and we applaud the efforts being made to improve the situation for non-BS majors, but we are looking for greater participation from these very large departments in presenting attractive courses for General Education.

- Similarly uneven is the distribution of students across courses, with a very few courses accounting for the majority of students. A concerted effort should be made between departments and counselors to make known to students the content and variety of courses that would suit their interests and capacities. These efforts should be coupled with an informative and attractive FSI website.

- Finally, ladder faculty should be part of reviewing and developing FSI GE courses. In addition, non-ladder faculty should be brought into the governance of their departments, especially as it relates to curricular decisions, since they are often in the front lines of teaching.

Section VI. Expanded Conception of FSI Courses and Laboratories and Cross-Disciplinarity

To respond to the rapidly changing character of modern science and to focus attention on student engagement in the practices of science, we have suggested a revised mission statement for FSI GE courses generally and a revised statement on the constitution of laboratory courses. We would especially like to see more innovative "laboratories" based on field studies, techniques of statistical and computational analysis, simulations, modeling and model systems, and on-line interactive experiments. And quite importantly, departments should be should be pursuing opportunities for cross-disciplinary work in both laboratory and lecture courses.

Section VII. Course Syllabi, Grading, and Evaluation

- Syllabi should be readily available on the FSI website so that as students review courses by department they can also review an up-to-date course syllabus. The syllabus should be attractively informative about the goals and content of the course and about student engagement in discussions and laboratories.
- Grading policies should be clearly stated and faculty should adhere more closely to University policy on grade distributions.
- The on-line student evaluation form for all FSI GE courses should include prompts to address directly the goals of the FSI GE curriculum.
- The GEGC should establish a systematic program for evaluating the content of all GE FSI courses, perhaps on a regular rotational basis of 1/5th of the courses per year.

APPENDICES

Appendix A—Charge letter

Appendix B—FEC and UgC request to chairs for GE plans and judgments

Appendix C—Chair's responses

Appendix D—Curricular data

Appendix E—List of Current Foundations of Scientific Inquiry General Education classes

Appendix A—Charge letter

MEMORANDUM

General Education
A265 Murphy Hall
157101

Date

Norton Wise (History/Physics)
Robert Fovell (Atmospheric and Oceanic Sciences)
Ohyun Kwon (Chemistry and Biochemistry)
James Larkin (Physics and Astronomy)
Jessica Lynch Alfaro (Institute for Society and Genetics)
Kevin McKeegan (Earth and Space Science)
David Paige (Earth and Planetary Science)
Deb Pires (Life Science Core)
Keith Stolzenbach (Civil and Environmental Engineering)
Blaire Van Valkenburgh (Ecology and Evolutionary Biology)
Resource Tony Friscia (GE Science Coordinator; Integrative Biology and Physiology)

Dear Colleagues:

We write to welcome you as members of the special Ad Hoc Committee for the review of UCLA's Foundations of Scientific Inquiry (SI) General Education (GE) curriculum, and to thank you for your willingness to participate in this critically important academic workgroup. This committee is jointly appointed by the Chair of the General Education Governance Committee and the Vice Provost for Undergraduate Education, and its charge is to conduct a self-review of the university's GE offerings in the life and physical sciences, to be completed by September 2013. During this review, the Ad Hoc Committee is expected to explore a range of issues and questions relating to the Scientific Inquiry foundation area's pedagogical aims, requirements, course quality, and student enrollments.

Professor Norton Wise, one of UCLA's most distinguished historians of science, has agreed to serve as the chair of the Ad Hoc Committee. Professor Tony Friscia of Integrative Biology and Physiology has agreed to provide resource support for both Norton and the committee. To further assist the ad hoc workgroup in its review of the Foundations of Scientific Inquiry, the administrative support team of the General Education Governance Committee will provide you with copies of the last report on the SI curriculum that was submitted to the Undergraduate Council of the Academic Senate in November 2006. They will also provide you with information on the development and implementation of the Foundations of Scientific Inquiry GE curriculum; SI course offerings; the SI instructional cohort; and SI student demographics and enrollment patterns. This information will be provided to you at the first meeting of the committee in late January 2013.

The Ad Hoc Committee's work will take place during the winter and spring quarters of 2013 and involve four, perhaps five, meetings. During the summer, the committee will prepare a final report for the General Education Governance Committee and the Undergraduate Council that addresses its findings with regard to the pedagogy, course quality, and student engagement in the Scientific Inquiry GE curriculum.   This report will be followed by an external review of the SI curriculum by the Undergraduate Council during the 2013-14 Academic Year.

Administrative support staff for the General Education Governance Committee will be contacting you regarding your availability for meetings in the upcoming academic year. If you have any questions, please contact Scott Chandler (chandler@physci.ucla.edu), Norton Wise (nortonw@history.ucla.edu), or your faculty liaison to the GE Governance Committee, Tony Friscia (tonyf@ucla.edu).

Thank you in advance for your commitment to support the important work of this committee. The efforts of this group will further strengthen our campus' GE offerings in the natural sciences.

Sincerely,

Scott Chandler
Chair, General Education Governance Committee

Judith L. Smith
Vice Provost for Undergraduate Education

Appendix B—FEC and UgC request to chairs for GE plans and judgments

UCLA MEMORANDUM

FACULTY EXECUTIVE COMMITTEE
College of Letters and Science

A265 Murphy Hall
Box 951571
Los Angeles, California 90095

To: J. David Neelin, Chair, Department of Atmospheric and Oceanic Science
Miguel Garcia-Garibay, Chair, Department of Chemistry and Biochemistry
Kevin McKeegan, Chair, Department of Earth and Space Science
Daniel Blumstein, Chair, Department of Ecology and Evolutionary Biology
Barney Schlinger, Chair, Department of Integrative Biology and Physiology
Frank Laski, Chair, Life Science Core Curriculum
Dimitri Shlyakhtenko, Chair, Department of Mathematics
Jeffery F. Miller, Chair, Department of Microbiology, Immunology, and Molecular Genetics
Utpal Banerjee, Chair, Department of Molecular, Cell, and Developmental Biology
James Rosenzweig, Chair, Department of Physics and Astronomy
Bruce Baker, Chair, Department of Psychology
Rick Paik Schoenberg, Chair, Department of Statistics
Glen MacDonald, Director, Institute of the Environment and Sustainability
Eric Vilain, Director, Institute for Society and Genetics

Fr: Troy Carter, Chair, Undergraduate Council
Michael Meranze, Chair, College Faculty Executive Committee

Date: November 5, 2012

Re: **Foundations of Scientific Inquiry and the continued suspension of the second laboratory/demonstration requirement**

As many of you know, the College Faculty Executive Committee and the Undergraduate Council voted in June to continue the Fall 2010 suspension of the second laboratory/demonstration requirement under the Foundations of Scientific Inquiry requirement through Spring 2014. The College FEC and UgC approved the original suspension in response to a request from the Deans to eliminate one of the four required science GE courses due, in part, to "the challenge of creating additional lab/demo courses or sections for non-science majors due to the lack of funds and a shortage of classroom laboratory space." Although the UgC did not support the original request, both the FEC and UgC ultimately did approve the suspension of one lab/demo requirement in recognition of the reality of the problem. Subsequent to the original two-year suspension, an *ad hoc* committee appointed by the Deans and charged with identifying specific deficiencies in the General Education science curriculum found that (1) two-thirds of non-science majors were satisfying their Life Science GE requirements with just two courses – Life Science 1 and Physiological Science 5 – due to the limited number of lab/demo course offerings, and (2) large physical science departments offered few, if any, GE courses for non-science majors. Given the large increase in the size of the undergraduate body, the question of the proper structure for the Science GE is, if anything, more pressing today.

Both the UgC and FEC believe the College must ensure that non-science majors have the opportunity to learn about scientific methods and practices while also having a reasonable range of curricular options. To simply allow the suspension to lapse and thereby return to the two lab/demo requirement is unfair to students and pedagogically unwise unless we can be confident that the College can offer a reasonable range of offerings. On the other hand, both committees believe that to make the suspension permanent without seriously exploring the possibility of creating a sustainable offering of diverse courses would fail to meet UCLA's avowed commitment to science General Education.

Our committees are committed to seeing this issue firmly resolved as quickly as possible, so in consultation with the chair of the Foundation of Scientific Inquiry Self-Review Committee, which is responsible for submitting a self-study of the GE science curriculum in preparation for next year's Academic Senate review, we write to ask that you discuss this matter with your faculty and that your department address the questions listed below. The FEC will evaluate your responses in order to decide whether the existing science GE structure is sustainable and whether there is a sufficient breadth of course offerings and quality of the lab/demo experience available to all undergraduates.

Please send your written responses to Kyle Stewart McJunkin (kmcjunkin@college.ucla.edu) no later than **Friday, February 15, 2013**. This information will be shared with the self-review committee and used in their report to the Academic Senate.

1. How will your department participate in the GE curriculum for non-science majors during 2013-14 academic year? Please be specific.

2. Do you believe the current science GE structure (2 Life Science, 2 Physical Science; 2 laboratory/demonstration courses, one in each area) is appropriate, or can the goals of the science GE curriculum be accomplished with the modified science GE structure (2 Life Science, 2 Physical Science; 1 laboratory/demonstration course, selected from either area)? Please explain your reasoning.

3. The cost of providing laboratory/demonstration experiences for GE students was a key factor leading to the suspension of the two-lab/demo requirement. Are there alternative, lower-cost options that might provide an equivalent experience in experimental science in your field (for example, computer-simulation-based labs)?

On behalf of our committee members, thank you in advance for responding to this request. In the meantime, if you, or your faculty, have questions about the suspension, we have placed all relevant documents at the following web address: http://www.college.ucla.edu/fec/public/fsi_suspension/. For other questions or concerns, please feel free to contact us at meranze@history.ucla.edu or tcarter@physics.ucla.edu. Kyle Stewart McJunkin, Director of Curriculum Coordination, and Melissa Spagnuolo, Principal Policy Analyst, are also available to assist you and can be reached at kmcjunkin@college.ucla.edu or mspagnuolo@senate.ucla.edu, respectively.

cc: Lucy Blackmar, Interim Associate Dean, College of Letters and Science
Scott Chandler, Chair, GE Governance Committee
Kyle McJunkin, Director of Curriculum Coordination, Division of Undergraduate Education
Joseph Rudnick, Dean, Division of Physical Sciences
Judith Smith, Dean and Vice Provost for Undergraduate Education
Victoria Sork, Dean, Division of Life Sciences
Melissa Spagnuolo, Principal Policy Analyst, Academic Senate
Scott Waugh, Provost and Executive Vice Chancellor
Norton Wise, Chair, Foundation of Scientific Inquiry Self-Review Committee

Appendix C—Chair's responses

UCLA INSTITUTE FOR SOCIETY AND GENETICS

Director
Eric J.N. Vilain, M.D., Ph.D.
Vice Chair
Christina Palmer, Ph.D.
Associate Director
Jessica Lynch Alfaro, Ph.D.
www.socgen.ucla.edu

UCLA Institute for Society and Genetics
Box 957221, 1320 Rolfe Hall
Los Angeles, CA 90095-7221

Telephone: 310-267-4990
Fax: 310-206-1880

TO

To: Kyle McJunkin

From: Jessica Lynch Alfaro, Associate Director, Institute for Society and Genetics

RE: FOUNDATIONS OF SCIENTIFIC INQUIRY AND THE CONTINUED SUSPENSION OF THE SECOND LAB REQUIREMENT

Below please find the responses from ISG faculty to your questions about the Foundations of Scientific Inquiry and the continued suspension of the second lab requirement.

1. How will your department participate in the GE curriculum for non-science majors during 2013-14 academic year? Please be specific.

   We will offer the courses SocGen 5 (Fall and possibly Winter), Soc Gen 101 (Winter), and SocGen M102 (Spring): these all carry GE Life Science credit. We do not offer any GE labs yet.

2. Do you believe the current science GE structure (2 Life Science, 2 Physical Science; 2 laboratory/demonstration courses, one in each area) is appropriate, or can the goals of the science GE curriculum be accomplished with the modified science GE structure (2 Life Science, 2 Physical Science; 1 laboratory/demonstration course, selected from either area)? Please explain your reasoning.

   Our faculty preferred a requirement of two laboratory courses. We felt that it would be okay if both labs were in the same area (i.e. life science), to help students focus on an area of interest. What we especially didn't want to see happen for our HBS B.A. majors was for them to take only one lab, and in physical science. We very much want them to have the experience of hands-on work in biology.

3. The cost of providing laboratory/demonstration experiences for GE students was a key factor leading to the suspension of the two-lab/demo requirement. Are there alternative, lower-cost options that might provide an equivalent experience in experimental science in your field (for example, computer- simulation-based labs)?

   ISG does not have funding or space for traditional wet labs, but our HBS majors do participate in community service learning in Los Angeles businesses and/or independent studies in wet labs on campus, for which they gain credit toward the major. Perhaps these other kinds of experiences could get GE certification as life science labs? For a genetics class (like SocGen5), we already do some of the discussion sections as ‘dry’ labs, even though we don’t have a ‘wet lab’ space. For intro field biology or environmental biology/toxicology courses, it might be possible to combine a ‘normal’ classroom and time spent outside collecting data to create a cheaper GE lab—perhaps only a couple of weeks would require a wet-lab type environment to process samples, or perhaps it could be done entirely without wet-lab space.

Some additional comments from ISG Faculty:

“I do find that having experience in a wet lab for all our students is important. Whenever I went with minor capstone students or Major 105A students to the drosophila lab or the sequencing lab they found this the most interesting part of the class.”

“In thinking about a lab experience in relation to the broad-based mission of ISG, it occured to me that a "lab" might do a mix of things with a mix of kinds of labs. 1.(wet lab) prepare the simplest possible material for sequencing (I don't know what that would be, perhaps an invasive plant like fennel, with sample processed by a quick inexpensive sequencing machine); 2.(computer lab) do a probability analysis on whether or not the sample (or similar) exhibits some characteristic; 3. (library lab) analyze some legal or environmental issue that hangs on the preceding analysis. In other words, try to hit the range of analytic techniques required to address some real-world issue.

This kind of lab would require cooperation from other departments. It might also be co-sponsored with other departments, like the Institute of the Environment, or EEB.”

“I think it is especially important to follow through different stages of scientific inquiry for a more integrated picture-- it would be interesting also to explore how much wet lab type of work could actually be done outside of a traditional laboratory-- i.e. Do It Yourself Bio lab-- while still complying with University regulations.”

An example (see attached) of a cheap alternative to a wet lab is an “exercise which is kind of a simulation of a lab experience. It basically demonstrates with paper, scissors, and glue how SNP chips work and samples are tagged to populations. It doesn't present these things in as much complexity as it could, but it is interesting nonetheless.”

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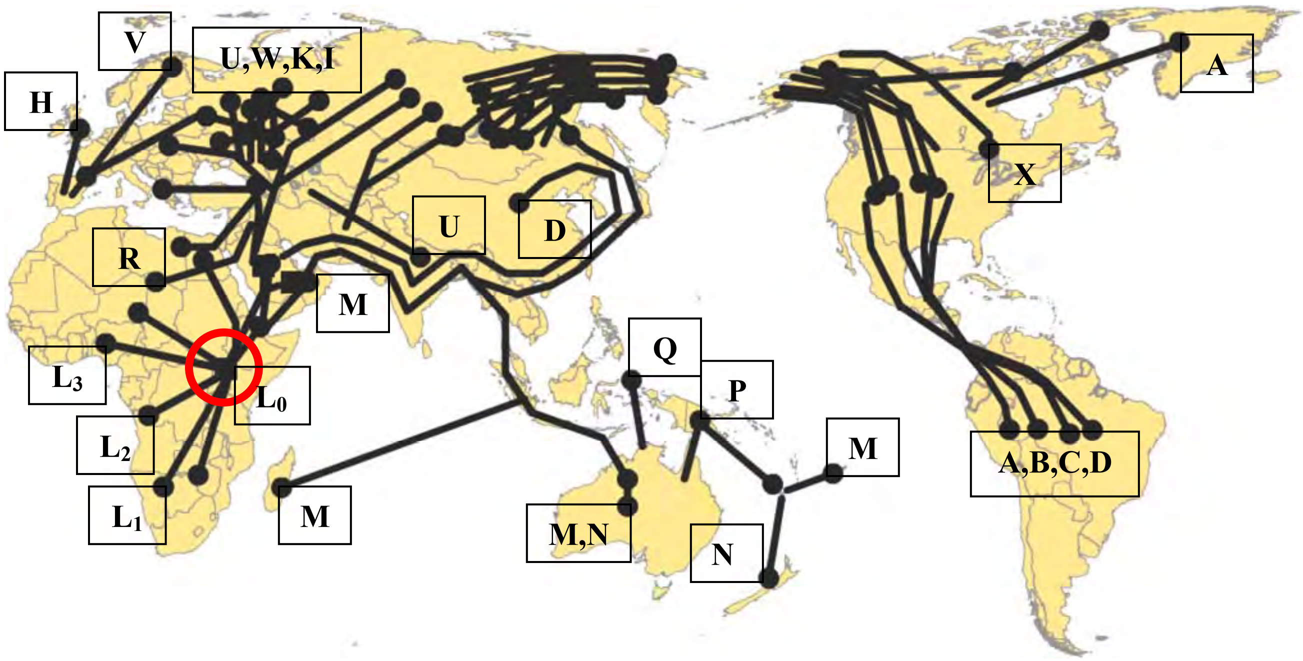
EXTRA

A Human Migration Map
Based on Mitochondrial DNA (mtDNA) Haplogroups

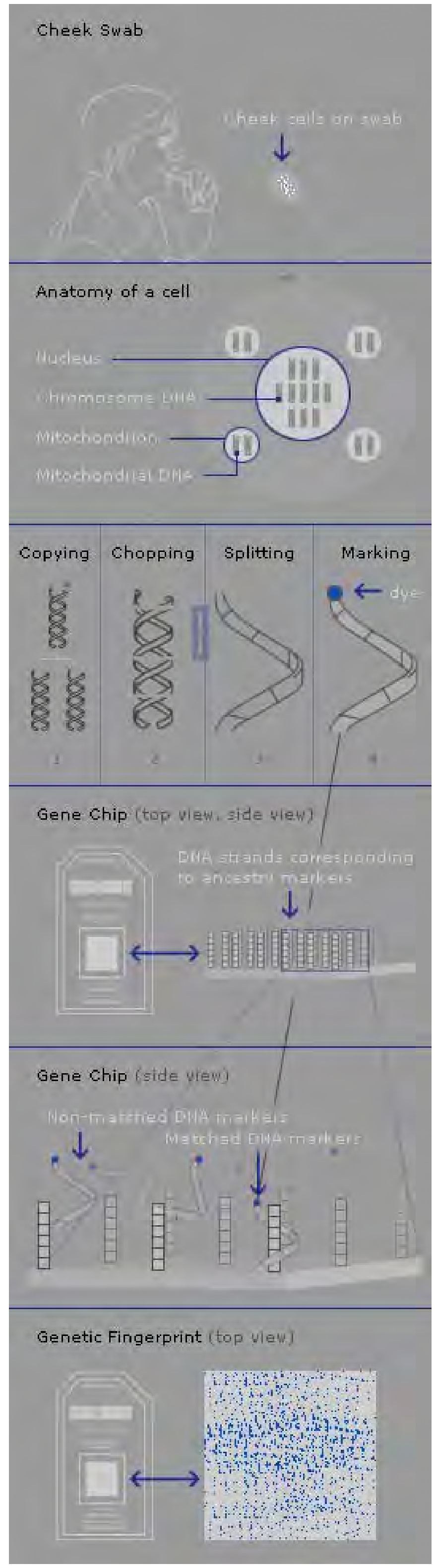


Letters on migration map correspond to mtDNA haplotypes

Human history told through the analysis of mitochondrial DNA (mtDNA)

Thousands of years ago	Event (Newly populated continent in brackets)
200-160	Dawn of Mitochondrial Eve (Africa)
160-130	First steps outward
130-90	The peopling of Africa
90-70	First exit out of Africa (Asia)
70-65	In search of greener lands
65-55	Birth of "Adam" (Australia)
55-40	Trek across Asia
40-25	Expansion to other continents (Europe)
25-19	Bridging the gap - Beringia (North America)
19-15	In search of a refuge (South America)
15-12	The last ice age breaks
12-present	Colonization, domestication, agriculture

How a Genetic Ancestry Kit Works



Step 1
A swab of the inner cheek loosens cells that contain DNA.

Step 2
DNA is extracted from either the mitochondria (to test matrilineage) or the nucleus (to test patrilineage or overall heritage).

Step 3
The DNA is replicated, chopped into small pieces, split into single strands, and marked with a dye.

Step 4
The chopped strands are then placed onto a gene chip that contains tens to hundreds of types of DNA corresponding to selected markers.

Step 5
The strands only stick to spots on the chip that have matching markers.

Step 6
Spots where the strands have stuck will glow, and the pattern of spots can be compared by computer to determine the person's genetic heritage.

Name: ____

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Tracing Human Ancestry with DNA Microarrays
Instructions & Worksheet

Background Information:
You are a student genetic paleontologist on a dig of an ancient city, approximately 10,000 years old, in Eastern South America, what is known as Brazil today. You and your fellow student genetic paleontologists have been given the job of DNA testing any human remains that you find in order to help understand where the inhabitants migrated from, what their ancestry was, and to paint a fuller picture of the city, its inhabitants and their jobs or reasons for being in the city.

You have come across four different sites within the walls of this ancient city where you have found human remains entombed. You know from having studied about this ancient city and from what you can determine from the layout of the city that it was a Mecca of civilization. Having found walls and artifacts, the city appears to have had many streets with shops selling food, ceramics, and other household goods.

Remains of residences are quite abundant also. You can assume that the city was host to many different peoples who either lived there or traveled there.

Using DNA microarray technology, you will be able to determine the ancestry of the four humans you have sampled.

The results will help establish migration routes to the city from other parts of the world.

Microarray Instructions and Worksheet (16 points)

You will now be mimicking the DNA microarray process, with an on-paper assignment. The steps on this worksheet correspond to the steps on the page entitled "How a Genetic Ancestry Kit Works".

Step 1 (Sample Collection): Instead of taking a cheek swab as you would do in a home DNA kits, assume that you have collected soft tissue from one person buried at each of the four different sites.

Step 2 (DNA Isolation): The tissue samples contain cells that have both mitochondrial DNA and DNA from the Y-chromosome, but back in the lab, you can assume that you have isolated the mitochondrial DNA from the other cellular material.

Step 3 (Replication, Chopping, Splitting, Marking): The DNA has been replicated to give cDNA. The cDNA is then split into single strands, giving the four sets of cDNA in front of you. Cut the four sets of cDNA using scissors if they are not yet cut so that the strands are distributed between group members. Color the strands using a colored pencil or highlighter if they are not yet colored.

Now compare the cDNA strands. It will help to line up the four strands and use the edge of a ruler to see the similarities and differences.

Tracing Human Ancestry with DNA Microarrays
Instructions & Worksheet

*a) How many of the bases are the same across all four strands?*_______

b) How many of the bases are different? ________

Next, chop the strands using scissors as a "restriction enzyme." The restriction enzyme is a protein that cuts DNA in specific points so that DNA can be sequenced. For this experiment, cut the cDNA strands at every fourth base -- your cDNA pieces should each have four bases. Then mark the 5' end of each cDNA fragment with an asterisk (*) signifying that the fragment has been tagged with a dye.

Step 4 (The DNA Microarray): Familiarize yourself with the DNA microarray master grid. This microarray has markers for five populations corresponding to mitochondrial DNA haplogroups. Mcroarrays can measure mutations as single nucleotide polymerisms (SNPs) or microsatellites. This microarray examines SNPs found in mitochondrial DNA.

c) For the DNA on the microarray, which end points up, the 3' end or the 5' end? ______

Step 5 (Hybridization): Hybridize your chopped cDNA fragments to the complementary base sequences on the microarray grid master by attaching them with a glue stick or tape. You will need to remember or look up which bases hybridize.

Fill in the blank with the letter of the base that hybridizes with the bases listed below:

d) Adenine (A) : ____

e) Thymine (T) : ____

f) Guanine (G) : ____

g) Cytosine (C) : ____

h) How many of your fragments hybridized with the DNA microarray? ________

i) Are there any DNA fragments from your sample that did not hybridize to the Microarray Grid Master? ________

What is the most likely explanation for the non-hybridization of the fragment?

j) ____

____

Tracing Human Ancestry with DNA Microarrays
Instructions & Worksheet

Step 6 (Analysis): Once everyone on your team has attached all his/her fragments, take a look at the Microarray Master Grid. Look carefully at where the different colored fragments have been placed, then fill in the microarray analysis grid for your sample. This mimics the "readout" process of the DNA microarray.

Determine which haplogroup (and location) each sample belongs to:

k) Sample #1 Haplogroup:_______ Location: ________________________

l) Sample #2 Haplogroup:_______ Location: ________________________

m) Sample #3 Haplogroup:_______ Location: ________________________

n) Sample #4 Haplogroup:_______ Location: ________________________

What conclusions can you make about the composition of the human population of this ancient city based on your analysis of the four different humans whose remains you analyzed?

o) ____

____

____

Congratulations! You have determined genetic ancestry information by analyzing DNA with a microarray!

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EXTRA

DNA SAMPLE STRANDS

#1	#2	#3	#4
(5' end)	(5' end)	(5' end)	(5' end)
T	T	T	T
C	A	C	T
C	G	T	A
G	C	A	A
A	A	A	A
T	T	T	T
A	A	A	A
T	T	T	T
C	C	C	C
G	G	G	G
T	T	T	T
G	G	G	G
A	A	A	A
T	T	T	T
C	C	C	C
G	G	G	G
C	C	C	C
A	C	T	A
G	C	T	C
G	A	A	C
A	A	A	A
A	C	T	G
C	G	T	G
T	T	C	G
G	G	C	G
G	A	T	A
T	T	G	A
C	T	T	G
T	T	T	T
T	T	T	T
G	G	G	G
A	A	A	A
T	T	T	T
T	T	T	T
A	A	A	A
C	C	C	C
T	T	C	G
T	G	G	T
T	A	A	G
T	T	A	T
(3' end)	(3' end)	(3' end)	(3' end)

Microarray Master Grid

A A A A	A A T T	A C T A	A G A T	A G G C
A T C G	C A C A	C A C A	C A T G	C C A G
C T A A	C T T C	G A A T	G A C A	G C T T
G G G T	G G T T	G T C C	G T G G	G T T A
T A A G	T C C C	T G C A	T T G A	T T T G

Microarray Analysis Grids

Sample #1

Sample #2

Sample #3

Sample #4

		*	*	
	*			*
				*

Haplogroup Q
(Indonesia)

		*		
*				
*				
*				
		*		

Haplogroup A
(South America)

			*	
		*	*	*
*				

Haplogroup L_1
(Eastern Africa)

*				*
				*
		*		
			*	

Haplogroup U
(Eastern Europe)

	*			
	*			
	*			
			*	
	*			

Haplogroup V
(Scandanavia)

Tracing Human Ancestry with DNA Microarrays

Homework Essay:

Write a one-page essay on the ethical issues surrounding genetic ancestry tests. Be ready to discuss your thoughts in the next class. Use your answers to one or more of these questions to help you develop your essay.

1. Can genetics be used to define race?
2. How much faith can you put in a result from a DNA ancestry test?
3. What are some ethical issues associated with profit-making companies collecting genetic information?
4. Can potential harm caused by genetic testing be balanced by potential good done when applied the tests for medical research?

Tracing Human Ancestry with DNA Microarrays

Homework Questions (16 points):

The following Web sites are excellent descriptive and demonstrative examples of DNA microarray technology:

The Online NewsHour's in-depth coverage of genetic ancestry, available at http://www.pbs.org/newshour/indepth_coverage/science/dna/ and "DNA Kits Provide Insight into Genetic Ancestry", available at http://www.pbs.org/newshour/bb/science/july-dec06/ancestry_07-20.html

More information about microarrays:
http://www.hhmi.org/biointeractive/genomics/microarray.html (Howard Hughes Medical Institute)
http://www.ncbi.nlm.nih.gov/About/primer/microarrays.html (National Center for Biotechnology Education)
http://affymetrix.com/corporate/outreach/educator.affx (Affymetrix)
http://www.bradenton.com/mld/bradenton/news/local/15256754.htm (Herald Today / Associated Press)
http://ww.bio.davidson.edu/courses/genomics/chip/chip.html (Davidson)
http://gslc.genetics.utah.edu/units/biotech/microarray (Genetic Science Learning Center, University of Utah)

Using the above links, answer these questions:

1. How are the various types of cells in our bodies different from one another, genetically speaking?

2. What does 'gene expression' mean?

3. Why do researchers generally purchase already manufactured microarrays from biotechnology companies rather than make them in their own labs?

4. Each spot on the microarray corresponds to what?

5. A DNA sequence of C-A-T-T-G will stick to, or hybridize to the following base sequence ____________ to form double-stranded DNA.

6. DNA sequence arrays can be used to detect what?

7. There are two great values of using microarray technology. What are they?

8. What is the biological source of restriction enzymes?

NEWSHOUR A NewsHour with Jim Lehrer special for students EXTRA

Tracing Human Ancestry with DNA Microarrays

Worksheet Answers

a) How many of the bases are the same across all four strands?__23___

b) How many of the bases are different? ___17___

c) For the DNA on the microarray, which end points up, the 3' end or the 5' end? __3'__

Fill in the blank with the letter of the base that hybridizes with the bases listed below:

d) Adenine (A) : _T__

e) Thymine (T) : _A__

f) Guanine (G) : _C__

g) Cytosine (C) : _G__

h) How many of your fragments hybridized with the DNA microarray? __5___

i) Are there any DNA fragments from your sample that did not hybridize to the Microarray Grid Master? __YES (5)__

What is the most likely explanation for the non-hybridization of fragments?

j) The DNA markers are common to two or more haplogroups so they aren't included in the section of the microarray for unique markers. It could be a gene that codes for a protein that is found in all human beings, perhaps the Cytochrome C protein.

Determine which haplogroup (and location) each sample belongs to:

k) Sample #1 Haplogroup:__U____ Location: ____Eastern Europe_______

l) Sample #2 Haplogroup:___A___ Location: ____South America_______

m) Sample #3 Haplogroup:__L_1__ Location: _____Eastern Africa______

n) Sample #4 Haplogroup:__V____ Location: ___Scandanavia_________

Note: Haplogroup Q (Indonesia) does not match with any sample.

What conclusions can you make about the composition of the human population of this ancient city based on your analysis of the four different humans whose remains you analyzed?

o) Certainly, the population was diverse with individuals having come there as travelers from various parts of the world.

Tracing Human Ancestry with DNA Microarrays

Homework Answers

1. All body cells contain the same DNA. The difference is in which genes are 'expressed' or turned on in the particular cells. For instance, the genes that code for actin and myosin, expressed in muscle cells, would not be expressed in skin cells.
2. Gene expression relates to the function of the gene. If the gene is 'expressed' in a cell, then it is producing a protein. If the gene is not expressed, then that protein is not being made in that cell.
3. It takes many steps, many different pieces of equipment, and thousands of DNA samples to make a microarray. Because of the time and energy a lab would need to manufacture its own microarrays, a lab generally chooses to spend money on a pre-manufactured microarray.
4. Each spot corresponds to one gene, and contains many probes, or the sequence for that one gene.
5. G – T – A – A – C
6. Microarrays can be used to detect SNPs, which are single nucleotide polymorphisms, usually harmless genetic mutations which accumulate over generations in the genomes of living organisms.
7. A scientist can analyze a lot of DNA at one time. And he/she can compare the DNA from two sources at the same time by computer analyzing the pattern of colors caused by the fluorescent tags on the DNA.
8. Restriction enzymes come from bacteria. They are thought to be defense mechanisms to aid the bacteria in destroying their enemies by cutting the enemy DNA into fragments.

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To: Kyle Stewart McJunkin

Re: **Foundations of Scientific Inquiry and the continued suspension of the second laboratory/demonstration requirement.**

Feb 8, 2013

Dear Kyle,

Below please find the responses to the questions regarding the continued suspension of the second laboratory/demonstration requirement on behalf of the Department of Statistics.

> *1. How will your department participate in the GE curriculum for non-science majors during 2013-14 academic year? Please be specific.*

The course we currently teach to non-science majors that satisfies the GE requirement in Statistics 10. The lab component is a crucial part of Statistics 10, and will continue. In 2013-14, we will continue to offer numerous sections of Statistics 10 in every quarter. We have and will continue to teach this course to approximately 2500 undergraduate students per year. About 2/3 of these students are non-science majors.

> *2. Do you believe the current science GE structure (2 Life Science, 2 Physical Science; 2 laboratory/demonstration courses, one in each area) is appropriate, or can the goals of the science GE curriculum be accomplished with the modified science GE structure (2 Life Science, 2 Physical Science; 1 laboratory/demonstration course, selected from either area)? Please explain your reasoning.*

The goals of the science GE can probably be accomplished with just 1 lab course. Many open scientific problems and much scientific research these days lie in the realm of analysis of existing data, rather than the physical acquisition of such data. Furthermore, increasingly data are being collected automatically in many fields, so that the physical collection of data by humans is becoming less important. Indeed, leading researchers in many scientific disciplines rarely do much data collection. Since most of the creativity and ingenuity in science comes into play during the analysis, modeling, and description of data and results, rather than their mere acquisition and collection, the bulk also of scientific education should focus on these areas as well.

> *3. The cost of providing laboratory/demonstration experiences for GE students was a key factor leading to the suspension of the two-lab/demo requirement. Are there alternative, lower-cost options that might provide an equivalent experience in experimental science in your field (for example, computer-simulation-based labs)?*

The Department of Statistics does have computer-based labs and these will continue. Such labs teach students how to visualize, summarize, model and describe a wide assortment of scientific data. Students in Statistics 10, for instance, learn how to perform regression and standard statistical tests, how to sample from common distributions, and even how to use the bootstrap to generate confidence intervals for parameter estimates.

I have no doubt that these labs are less costly than other types of labs, but it should be noted that these labs are not inexpensive, and if the GE is expanded in this area we will need additional funds to handle the additional lab space, computers, and maintenance required.

Sincerely,

Frederic Paik Schoenberg
Chair, UCLA Statistics

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Mr. Kyle S. McJunkin
College of Letters and Sciences
UCLA

Re: Foundations of Scientific Inquiry and the continued suspension of the second laboratory/demonstration requirement.

Here is our response to the three questions posed in the letter of November 5, 2012.

1. In 2013-14, Psychology will offer three sections of Psychology 15, one in each quarter. This is a 4-unit course in the Foundations of Scientific Inquiry category. Next year we will also be developing a one-unit lab component for Psych 15 that will fulfill the GE lab requirement; we expect this will be approved by 2014-15. Two of our faculty, Professors Marti Haselton and Barbara Knowlton, teach in the GE clusters.

2. We support continuing the suspension of the second laboratory requirement is best, at least for an additional three-year period at which point the requirement should be reassessed. Given the increasing undergraduate enrollments, decreasing faculty, shortage of lab options, and overall heavy course requirements, this seems the only prudent thing to do.

3. We have not yet experimented with computer-simulation-based labs, so I cannot comment on this. We are certainly open to exploring this alternative and look forward to hearing what you find out from other departments. The broader topic of on-line courses is of interest to several of our faculty but the majority are not enthusiastic about going down this road. However, we are increasing on-line exercises in our undergraduate statistics course (100A) and this is proving successful.

Sincerely,

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Prof. Troy Carter, Chair, Undergraduate Council
Prof. Michael Meranze, Chair, College Faculty Executive Committee

To the joint committee,

This memo is in response to the letter formulated by Profs. Carter and Meranze from the joint committee formed by the Undergraduate Council and the College of Letters and Science Faculty Executive Committee, concerning the Foundations of Scientific Inquiry requirements, in particular addressing the continued suspension of the second laboratory or demonstration requirement. The issues raised in this letter are of critical importance, and I welcome the chance to give input on formulating a renewed stance on the modifications to the Foundations of Scientific Inquiry requirements, particularly in light of the wave of new undergraduate enrollees arriving currently.

I will address the three questions posed in the letter separately. By question:

1. **How will your department participate in the GE curriculum for non-science majors during 2013-14 academic year? Please be specific**.

In the text of the letter, it is written that "large physical science departments offered few, if any, GE courses for non-science majors". In order to clarify this assertion, which is erroneous in the case of Physics and Astronomy, and to illuminate our plans for the upcoming year, I offer a listing of our 2012-13 offerings in GE electives and courses required as prerequisites by other departments. The following GE and service courses represent a commitment of 17 instructors by the department.

(a) *Astronomy 3: Nature of the Universe* is a GE course, containing a lab component. It is offered in two course listings per quarter, with 200 students each in Fall and Winter, and 130 in Spring. The total is over 1000 students per year
(b) *Physics 10* is a GE course, with no lab component. In this academic year, we have enrolled 135 students in the Fall, 188 in the Winter quarter, yielding a total of over 300 students per academic year. We have also recently re-introduced Physics 10 in summer session, with an enrollment of 90.
(c) *GE Cluster 70: Evolution of Cosmos and Life* is a freshman cluster course. The Department of Physics and Astronomy contributes one quarter of teaching of the ~200 students in this yearlong course.

(d) *Physics 1* is an introductory series taken by many science and engineering majors, with a significant laboratory component listed as *Physics 4AL* and *4BL*. The population this quarter is: Physics 1A — 4 sections containing720 students total; Physics 1B — 1 section containing 190 students; and Physics 1C —1 section with 170 students. The total number of Physics 1 students is 1080 this quarter.

(e) *Physics 6* is an introductory series taken by life science majors and premedical students, with a significant laboratory component. The enrollment this quarter is: Physics 6A — 4 sections with 750 students; Physics 6B — 2 lectures 330 with students; Physics 6C: 2 lectures with 400 students. The total number of Physics 6 students is 1480 this quarter.

Points (a) through (c) directly address the perceived issue of lack of offerings for non-science GE students, while points (d) and (e) emphasize the large service and accompanying significant laboratory teaching aspect to the department's offerings.

For the upcoming year, there are several changes affecting the GE courses offered by the department. We will likely be adding more sections of Physics 10, including an expansion of summer school to two sections. We are also weighing two initiatives: an online version of Physics 10; and a new course tentatively entitled *Physics X - Modern Physics for Poets.* Both initiatives have the potential to have a laboratory component added, and these options are under discussion as well.

In the large introductory series courses, there are two notable changes expected. The laboratory component of Physics 6 will be revised, modernized and improved. Also, we expect that electrical engineering students will be required to take Physics 1C, abandoning an EE course dedicated to electricity and magnetism. In this context, we are also examining creation of a new honors curriculum in Physics 1C dedicated to students entering physics, astrophysics, and electrical engineering.

2. Do you believe the current science GE structure (2 Life Science, 2 Physical Science; 2 laboratory/demonstration courses, one in each area) is appropriate, or can the goals of the science GE curriculum be accomplished with the modified science GE structure (2 Life Science, 2 Physical Science; 1 laboratory/demonstration course, selected from either area)? Please explain your reasoning.

A working knowledge of the fundamental concepts underpinning science is an indispensible part of the liberal arts education the College seeks to impart to our students. The increasing technological complexity of the modern world, as well as the related phenomenon of science-denial, make the creation of an educated mind, capable of critical thinking about science, yet more urgent. The trial-and-error exploration of scientific concepts in the laboratory context are in integral component of how one obtains a working knowledge of science, and the critical thinking skills that are based upon this knowledge. I do not find the assertion that, given the seriousness of the mission entrusted to us as a faculty to create modern, educated persons, that one may train the students' minds to an adequate level in a single, one-quearter course, supportable.

3. The cost of providing laboratory/demonstration experiences for GE students was a key factor leading to the suspension of the two-lab/demo requirement. Are there alternative, lower-cost options that might provide an equivalent experience in experimental science in your field (for example, computer-simulation-based labs)?

The cost of upper division labs is quite significant, particularly on a per-student basis. In contrast, the types of experiments that can be utilized in GE lab or demonstration courses are cost effective. If we were to introduce more laboratory course work, the largest challenge would be to find classroom space. In my mind, freedom from this constraint is one of the best arguments for the introduction of online teaching. As such, I am open to considering proposals for computer-simulation-based laboratory course work. An innovative approach containing online elements to introduction of lab components in Physics 10 and Physics X would permit a larger throughput of non-science majors to fulfill their GE lab requirements at low cost.This type of initiative also has the benefit that it permits the introduction of computer based data analysis and modeling more easily.

Thank you for the opportunity to contribute to this important discussion. If you have need of any further information or clarification of the contents of this report, please do not hesitate to contact me.

Sincerely,

James Rosenzweig
Professor of Physics
Chair, Dept. of Physics and Astronomy

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DEPARTMENT OF MOLECULAR CELL AND DEVELOPMENTAL BIOLOGY
COLLEGE OF LETTERS AND SCIENCES AT UCLA

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Tuesday, 19 February 2013

Dear Kyle,

Please find below the Department of Molecular and Cell Biology's responses to questions regarding GE for Non Science Majors.

How will your department participate in the GE curriculum for non-science majors during 2013-14 academic year? Please be specific.

1) MCD BIO 50: Stem Cell Biology, Politics and Ethics (5 units)
    a. This will be offered in the Fall, Winter and Spring quarter 13/14
        i. No lab/demo

2) MCD BIO 40 AIDS and Other Sexually Transmitted Diseases (5 units)
    a. This may be offered in F13 if the Dean requires additional GE classes for non-science majors
        i. No Lab/demo

3) MCD BIO 70 Genetic Engineering and Society (5 units) (L/D)
    a. This is an on-line course that is offered during the Summer
        i. Lab/demo

Previously offered GE for non-science majors

4) MCD BIO 80. Green World: Plant Biology for Now and Future (5 units) (L/D)
    a. This class was last offered in 2007 and we have no plans to teach it for 12/13
        i. Lab/demo

Do you believe the current science GE structure (2 Life Science, 2 Physical Science; 2 laboratory/demonstration courses, one in each area) is appropriate, or can the goals of the science GE curriculum be accomplished with the modified science GE structure (2 Life Science, 2 Physical Science; 1 laboratory/demonstration course, selected from either area)? Please explain your reasoning.

It would be sufficient for the science GE to remain at the modified structure (1 laboratory/demonstration) as long as the one lab serves to demonstrate to the students a contemporary example of science.   It is unclear how an extra lab/demonstration would be necessary unless a second laboratory class is deemed to overcome a recognized unmet need for the students

> *The cost of providing laboratory/demonstration experiences for GE students was a key factor leading to the suspension of the two-lab/demo requirement. Are there alternative, lower-cost options that might provide an equivalent experience in experimental science in your field (for example, computer- simulation-based labs)?*

One of our GE courses (MCD BIO70) was offered as an online course in the Summer of 2012. Construction of the online course involved substantial partnership with the School of Film and Television. This model could be used to create new contemporary GEs that have broad appeal to students.   An alternate possibility for a lab demonstration could be based on the model we use in the MCD BIO 50: Stem Cell Biology, Politics and Ethics. This involves a Stem Cell Scientist visiting the class and giving a simple scientific lecture. The scientific lecture is “deconstructed” by the students in discussion sessions. The deconstruction of the scientists lecture involves the student writing papers on the scientific content with the help of the instructor. This could be further expanded by having the students visit the laboratory and observe stem cells through the microscope or being analyzed using simple assays.

If you have any further questions, then please do not hesitate to contact me.

Amander Clark PhD
Associate Professor and Vice Chair
Department of Molecular Cell and
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University of California, Los Angeles
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To: Letters and Science Undergraduate Council
College Faculty Executive Committee

Fr: Bridget Wells, Student Affairs Officer

Date: February 15, 2013

Re: Response to inquiry regarding continued suspension of the second laboratory/demonstration requirement within the Foundations of Scientific Inquiry General Education category

I am responding on behalf of Dr. Jeffery F. Miller, Chair of the Department of Microbiology, Immunology, and Molecular Genetics.

1. Our department will participate in the GE curriculum for non-science majors for the 2013-2014 academic year by continuing to offer MIMG 6, Microbiology for Nonmajors, in Winter and Summer quarters. The enrollment capacity for Winter will be between 120 and 130. For Summer the enrollment capacity will be between 50 and 60.
2. We believe that the goals of the science GE curriculum can be accomplished with the modified science GE structure (2 Life Science, 2 Physical Science; 1 laboratory/demonstration course, selected from either area). In this format the student may choose a lab/demo course from the discipline in which (s)he is most interested, and the total NUMBER of courses remains the same.
3. The department agrees that a computer-simulated lab would provide a sufficient lower-cost alternative to a lab/demo course, although is not aware of any other options that would still maintain the integrity of a lab/demo course.

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February 22. 2013

1. How will your department participate in the GE curriculum for non-science majors during 2013-14 academic year?

The LS Core teaches 3 GE courses: LS1, LS2 and LS15. LS1 is a GE course with lab/demonstration and LS2 is a GE course without a lab. Both LS1 and LS2 were designed for Life Sciences majors; they were not intended to serve non-science majors.

LS15 is a 5-unit course for non-science majors that was designed by Jay Phelan and Cliff Brunk and is now taught by Jay. His description of the course and his plans for next year follows.

LS15 meets for three hours of lecture and one two-hour discussion section each week. The course is a broad introduction to biology, with a focus on scientific literacy and scientific thinking, particularly the methods by which scientists formulate and test hypotheses, and how data interpretation and analysis can guide us in answering questions about the biological world. The course is designed to prepare students to talk confidently and knowledgeably about science with others, to be intelligent consumers of scientific information, and to make responsible decisions about scientific issues. The textbook is specifically written for a general education audience.

The lecture topics range broadly, but typically include the following.

1. Scientific Thinking and Decision-Making
2. Evolution and Genetics
3. Physiology: Chemistry, Nutrition, Reproduction, Endocrinology, and Neurobiology
4. Human Behavioral Biology

LS15 does not currently have a lab component. We are, however, in the process of developing one. Our goal is that LS15 with the new lab component will satisfy the "Foundations of Scientific Inquiry" for Life Science with a Laboratory Component.

The focus of the labs is on inquiry and teaching students how to structure their observations so as to effectively test hypotheses. There will be an emphasis on the presentation, analysis, and interpretation of data, along with the articulation and refinement of hypotheses and conclusions.

There will be four distinct lab exercises during the quarter. Each of these will cover two or more weeks, with time devoted to 1) the development of testable hypotheses, 2) the design of methods by which they can collect relevant data, 3) written and oral presentations of results, analyses, and interpretations, and 4) discussion about the uncertainties associated with their measurements, and how they constrain the conclusions that they can draw from the work.

The exercises that have been developed so far include:

1. **Microbial diversity in your world:**

Students will develop and test hypotheses about the density and diversity of microbes in different locations in their world. They will learn and use numerous techniques as they collect samples with air plates and by swabbing surfaces and they will evaluate bacterial growth and diversity on Petri dishes.

2. **Nutrition & digestion: blood sugar influences on cognitive and physical performance:**

Students will develop and test hypotheses about the impact of low vs. high blood sugar on a variety of cognitive and physical tasks with relevance to their lives (including grammatical reasoning, memory, visual information processing, reaction time, and grip strength).

3. **Environmental influences on hormones and their implication for behavior and physiology:**

Students will develop and test hypotheses about the impact of stress-inducing environmental variables on levels of circulating cortisol and the consequences for cognitive and physical performance.

Last years change from having a lab component in LS2 and LS3 to the independent lab LS23L has optimized the use of the LS Core lab space. The change has freed up lab time allowing access to LS15. Currently we are planning on having 216 LS15 students / quarter and 648 students / year as the class will be taught all three quarters next year.

2. Do you believe the current science GE structure (2 Life Science, 2 Physical Science; 2 laboratory/demonstration courses, one in each area) is appropriate, or can the goals of the science GE curriculum be accomplished with the modified science GE structure (2 Life Science, 2 Physical Science; 1 laboratory/demonstration course, selected from either area)? Please explain your reasoning.

I believe the current science GE structure is appropriate and we should return to it when finances allow. It is not necessary that we return to it immediately. The reason I feel this way is that I wish George Bush would have had another science lab course.

3. The cost of providing laboratory/demonstration experiences for GE students was a key factor leading to the suspension of the two-lab/demo requirement. Are there alternative, lower-cost options that might provide an equivalent experience in experimental science in your field (for example, computer- simulation-based labs)?

Utpal Banerjee and colleagues have pioneered a new type of lab course where a research lecture is deconstructed. A journal article describing this course is attached. I believe a student learns more about research in a deconstruction class than they learn in a wet-lab course. I also believe a science deconstruction course is appropriate for GE non-science majors.

Yours,

Frank Laski
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"Deconstructing" Scientific Research: A Practical and Scalable Pedagogical Tool to Provide Evidence-Based Science Instruction

Ira E. Clark[1,9], Rafael Romero-Calderón[1,9], John M. Olson[1], Leslie Jaworski[2], David Lopatto[2], Utpal Banerjee[1,3]*

1 Department of Molecular, Cell, and Developmental Biology, University of California Los Angeles, Los Angeles, California, United States of America, **2** Department of Psychology, Grinnell College, Grinnell, Iowa, United States of America, **3** Department of Biological Chemistry; Molecular Biology Institute; Broad Stem Cell Research Center, University of California Los Angeles, Los Angeles, California, United States of America

There is growing interest among scientists and science educators to include active learning approaches that allow students to appreciate how primary evidence is used to construct scientific knowledge [1,2]. Indeed, the National Academies and others have recognized four essential objectives for science education at elementary, middle and high school, and undergraduate levels: (1) understanding and utilizing scientific explanations of the natural world, (2) knowing how to generate and evaluate scientific evidence, (3) understanding the nature and development of scientific knowledge, and (4) participating productively in scientific practices and discourse [2–5]. In the life sciences, both discovery-based research courses and journal clubs accomplish many of these learning goals with undergraduates [6–10], although each has significant limitations. Hands-on research classes have proven to be a successful entry point for training new students in the process of scientific discovery, but, with the exception of bioinformatics-based classes [10], the heavy demand for space and resources constrains the scalability of these strategies. Journal clubs are logistically easier to run, but are only effective in small formats and are usually limited to more advanced students.

To address these issues, we have designed a strategy we call "research deconstruction" that trains first- and second-year undergraduates to analyze real data from current, cutting-edge research, presented to them in the form of a high-level research seminar. We teach the deconstruction course in two five-week modules, each module beginning with an hour-long, full-scale research seminar by an invited faculty speaker. At this point, the students have at best a rather superficial comprehension of the seminar, as we encourage the speaker to deliver his or her standard research presentation, replete with experimental data normally presented to a more sophisticated audience. A separate course instructor then distils the content of the seminar over 10 contact hours of classroom instruction. As the research seminar is videotaped and archived, students can refer back to it regularly. Each classroom lecture typically focuses on approximately 5–10 minutes of the seminar, allowing the instructor to approach each fragment independently from many different angles and explore the fundamental concepts underlying the creation of the data. (For examples of seminar excerpts and their deconstruction, see Videos S1, S2, and S3, also at http://www.mcdb.ucla.edu/research/Banerjee/ResearchDeconstruction/).

During the deconstruction phase, the students identify hypotheses from the seminar, explore the experimental approaches used, and actively analyze the data—a collective exercise that deconstructs a complex research seminar into manageable portions. As concepts and techniques are introduced to them, stripped of jargon, the students begin to see the logic of the research. In the process, they follow the story of the seminar and experience discovery moments as the implications of each experiment become clear.

Consistent with the four above-mentioned objectives for science education [1–5], we require our students to independently scrutinize data and generate valid conclusions. Class assignments avoid testing memorization of facts in favor of testing the ability to formulate novel hypotheses, propose experiments, and suggest future directions for the research. (See Text S1 for sample problem set questions). Ample office hours are made available throughout the course for students to discuss any conceptual problems that may arise.

Remarkably, by the end of the five-week period, students are able to discuss the experiments intelligently and critically, and can apply the techniques they learned to hypothetical scenarios involving scientific research within as well as outside the field of the seminar presentation. This is further evidenced at an hour-long question and answer session hosted by the seminar speaker at the end of the module. While students are generally reluctant to ask questions when they first hear the seminar, by the end of the deconstruction they have

The Community Page is a forum for organizations and societies to highlight their efforts to enhance the dissemination and value of scientific knowledge.

Citation: Clark IE, Romero-Calderón R, Olson JM, Jaworski L, Lopatto D, et al. (2009) "Deconstructing" Scientific Research: A Practical and Scalable Pedagogical Tool to Provide Evidence-Based Science Instruction. PLoS Biol 7(12): e1000264. doi:10.1371/journal.pbio.1000264

Academic Editor: Cheryl A. Kerfeld, University of California Berkeley/JGI, United States of America

Published December 22, 2009

Funding: Funding for this project was provided by the Howard Hughes Medical Institute (http://www.hhmi.org). The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Competing Interests: The authors have declared that no competing interests exist.

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9 These authors contributed equally to this work.

the confidence to engage the speaker and ask thoughtful and often challenging questions. Speakers have commented favorably on the level of discussion in the Q&A sessions and the improvement they perceive in student comprehension over the five weeks since they presented their research. (See excerpts of faculty testimonials in Figure 1 and more extensive comments in Text S2).

No laboratory infrastructure is necessary for this methodology, and the seminar deconstruction format is readily adapted to a variety of subjects and scientific disciplines. To date, 24 different faculty members have participated in the courses, presenting research on a wide range of topics including stem cell biology, epigenetics, neurobiology, and microbiology (Figure 1). We have received enthusiastic participation by our strongest research faculty, who have recognized that by delivering their current research seminar and hosting the final Q&A session, they provide a valuable and effective bridge between their research and educational efforts, offering large numbers of students the opportunity to engage directly in diverse fields of scientific study. The research deconstruction approach is com-

Sample Faculty Comments

"I gave more or less the same research talk that I gave in an invited seminar at Harvard just a couple months before. When I came back 5 weeks later, after these freshman/sophomores had "deconstructed" my seminar, I was surprised at the level of interest and the incisive questions that were asked by some of the students."

"It was truly remarkable to witness the transformation that took place between the first seminar and the Q & A session...Many of the questions that I was asked ... would not have been out of place at a professional meeting of the leaders in the field."

"My impression is that this is an excellent format for teaching students scientific methods and concepts, as well as how to approach biological questions. I wish I had had an opportunity to take a course like this in college!"

"Teaching in this class was such a pleasure...Talking with these students and hearing their excitement was a refreshing reminder of the reward of teaching."

"The students had an incredible grasp of my research and asked very good questions about all aspects of my research...These students had a unique experience to learn science at a much deeper level than it is typically taught in college and to interact with professionals (scientists)... I wish a class like this had been offered when I was a student."

"I was extremely impressed with the insightful questions they asked about my research. They displayed a level of comprehension and critical thinking that I was surprised to see in freshman and sophomores."

"Upon my return visit, the student questions revealed a surprising depth of understanding, both about the general topic and the specific methodology...It is clear that this course format is an outstanding strategy to introduce undergraduates to research science."

"Students had prepared specific and insightful questions related to experimental approach, design, and rationale. It was clear that the seminar deconstruction methods and the course instructors' guidance contributed to a depth of understanding that is not typical for undergraduates who are making their first foray into primary research literature."

Invited speakers for deconstruction

Utpal Banerjee - *hematopoiesis in Drosophila*
Hanna Mikkola – *blood stem cell niches in mammals*
Alvaro Sagasti - *morphogenesis of sensory neurons*
Stephanie White - *language and the brain*
Benhur Lee - *identification of viral receptors*
Beth Lazazzera - *bacterial biofilm formation*
David Krantz - *function of monoamine transporters*
David Walker - *oxidative stress and aging*
Fernando Gomez-Pinilla - *effects of diet in the brain*
Art Arnold - *sex and the brain*
Luisa Iruela-Arispe – *cell signaling and vascular maintenance*
Patricia Johnson – *interactions of parasites with host cells*
Kelsey Martin – *molecular mechanisms of learning and memory*
Tim Lane – *Wnt signaling, proteasomes and breast cancer*
Arnie Berk – *adenovirus regulation of the host cell cycle*
Volker Hartenstein - *stem cells of the gut*
Greg Payne – *vesicle traffic in yeast*
John Colicelli – *effectors of Ras signaling*
Fuyu Tamanoi – *Tor signaling and growth control*
Steve Smale – *gene regulation in innate immunity*
Kathrin Plath – *induced pluripotent stem cells*
Gerry Weinmaster – *activation of the Notch receptor*
Rachelle Crosbie – *biochemistry of muscular dystrophy*
Margot Quinlan – *regulators of the actin cytoskeleton*

Figure 1. Excerpts of comments from invited faculty speakers and research topics deconstructed. These comments should be viewed only as testimonials and not as data. For more complete impressions, see Text S2. Names and seminar topics of faculty speakers who have participated in the research deconstruction courses from Spring 2007–Spring 2009.
doi:10.1371/journal.pbio.1000264.g001

parable to hands-on research courses in teaching students to evaluate and interpret scientific evidence, while at the same time being highly scalable and easily transferable to other institutions. Over seven academic quarters at University of California Los Angeles (UCLA), we have used this strategy to train almost 500 undergraduates from a variety of majors, most of whom are first- and second-year students with minimal preparation in the life sciences.

We have previously described our Howard Hughes Medical Institute (HHMI)–funded hands-on research program, the Undergraduate Research Consortium in Functional Genomics (URCFG), which over the past six academic years has trained nearly 500 students in scientific discovery through direct participation in original research [6,8]. By several criteria, URCFG has been quite successful. The program has yielded several peer-reviewed publications, including two papers with 134 and 264 undergraduate authors [6,8,11,12]. It has identified students for further independent research, many of whom have since graduated and are now in Ph.D. or M.D.-Ph.D. programs. Finally, survey data indicate that students in URCFG report significant gains in a number of important areas such as understanding science, analyzing data and interpreting results ([8] and Figure 2).

Assessment data from the Classroom Undergraduate Research Experience (CURE) survey ([13,14] and http://www.grinnell.edu/academic/psychology/faculty/dl/sure&cure/) show that students from the research deconstruction course report learning gains as high as or greater than those of reference cohorts, including students engaged in a summer research experience, in nearly all areas surveyed (Figure 2). The learning gains are not as strong in some areas as those reported by URCFG students, which are considerably better than those of the reference cohorts in all skills except oral presentation (an element not emphasized in URCFG). However, in several important areas, including understanding the research process, how knowledge is constructed, and the role of supporting evidence, learning gains reported by students of the deconstruction courses compare favorably with those of URCFG students and are considerably better than those of reference cohorts. Thus, exposing students within a classroom setting to the design and execution of a research project appears to be an effective means of teaching them the logic of research.

To further improve upon the learning gains from research deconstruction, we have created an "enhanced" version of the course, taught to a smaller group of students from the larger research deconstruction course or from URCFG. Students are accepted into the enhanced course based on their interest in research and performance in the previous course. The enhanced research deconstruction course includes assignments of primary literature, student presentations of research papers, written reports on the research seminars, and a strong emphasis on experimental design and proper use of controls (for an example of the enhanced research deconstruction delivered to students who have previously taken the basic course, see Video S4, also at http://www.mcdb.ucla.edu/research/Banerjee/ResearchDeconstruction/enhanced.html). Early indications from the CURE survey suggest that these changes yield learning gains comparable to or better than URCFG in almost all areas measured (Figure 2). The improvements observed may result from elements added to the course syllabus, smaller class size, student selection, benefit of a prior experience in evidence-based analysis, or, most likely, a combination of these factors. We conclude that a combination of a regular and an enhanced deconstruction experience elicits the highest gains for the student. However, we emphasize that even the

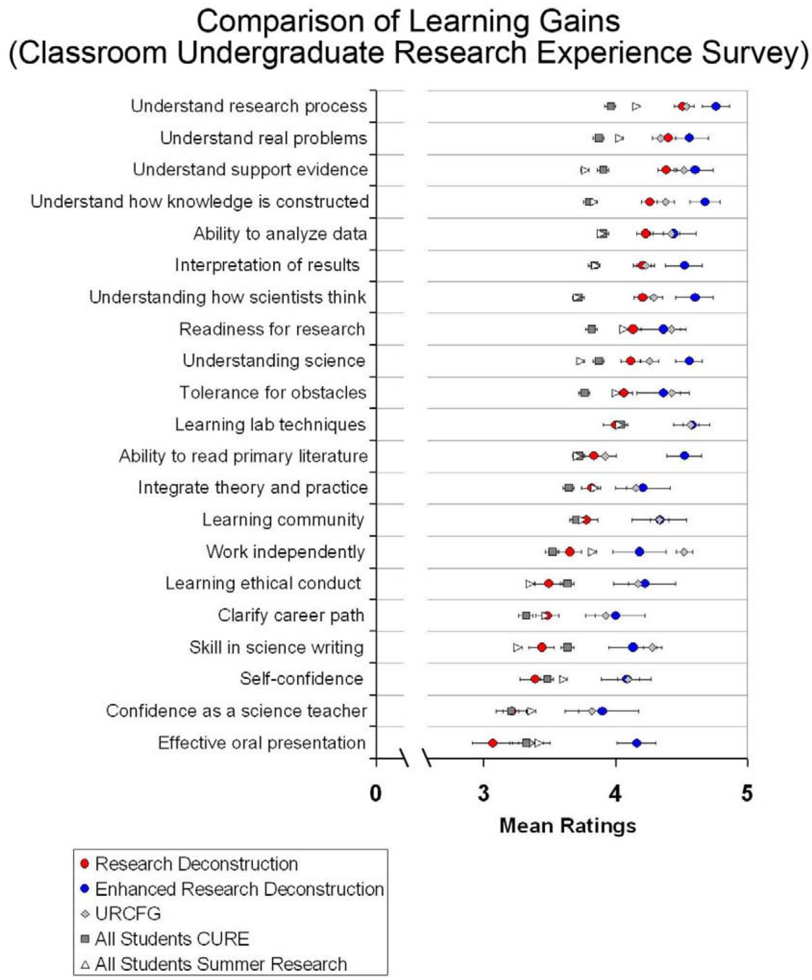

Figure 2. Learning gains produced by UCLA research deconstruction and hands-on research (URCFG) courses. CURE survey data from Spring 2007–Spring 2009 are compared to the means from all students participating in the CURE survey during Spring 2009, as well as to students engaged in a summer research experience in 2008, as measured by the comparable SURE II (Summer Undergraduate Research Experience) survey. The CURE and SURE surveys include identical items that permit comparisons. The CURE reference cohort derived from introductory to advanced biology courses that contained some research-related component. The typical student in the SURE cohort was a third- or fourth-year student. Scale: 1 = little to no gain; 2 = small gain; 3 = moderate gain; 4 = large gain; 5 = very large gain. Average N values: UCLA research deconstruction – 157; UCLA enhanced research deconstruction – 24; URCFG – 147; all students CURE – 598; all students summer research – 1,489. Error bars represent one standard error.
doi:10.1371/journal.pbio.1000264.g002

basic deconstruction course alone is effective at eliciting gains in important conceptual areas that are vital to science education.

The deconstruction format has been valuable in identifying students with promise for productive independent research. Like URCFG, it serves as a screening course to recruit students for the newly created UCLA Minor in Biomedical Research (http://www.biomedresearchminor.ucla.edu), a comprehensive research training program that places promising students in laboratories throughout the College and the School of Medicine while providing didactic training to complement their research. Since the spring of 2007, the larger deconstruction classes have placed 79 students within this minor, compared to 43 from URCFG, which is limited in scale due to the demand for laboratory resources.

Previous studies have shown that analysis of primary research literature is a highly effective way to train students in understanding how knowledge is created and evidence evaluated [7,15]. Scientific instruction in the context of real research problems may be comparable to use of case studies in promoting higher order critical thinking [16]. Our experience suggests that an extensive theoretical knowledge base is not essential for early-stage undergraduates to understand biomedical research. In fact, the research deconstruction course format emulates the scientific process, whereby students begin by analyzing data, and end by using it to derive and appreciate general biological principles. A valuable component to add to the deconstruction approach may be seen in the use of adapted primary literature (APL), a format designed for high school students, derived from primary research papers [17,18].

Research deconstruction provides an effective pedagogical tool to offer evidence-based science instruction to a large number of early-stage students. Demanding very few material resources, it is a strategy that can be adopted by a broad spectrum of academic institutions. For the future, research seminars available from Internet resources, such as the American Society for Cell Biology's iBioSeminars (http://www.ibioseminars.org), might also be used as a resource for material to deconstruct in the classroom. A Web-based repository of both seminars and deconstruction classes that is updated on a regular basis will also prove to be a valuable resource that can be accessed universally for use in any course.

Supporting Information

Text S1 Sample problem set questions from research deconstruction courses.
Found at: doi:10.1371/journal.pbio.1000264.s001 (0.03 MB DOC)

Text S2 Comments from invited faculty speakers who participated in the research deconstruction courses, provided as testimonials.
Found at: doi:10.1371/journal.pbio.1000264.s002 (0.03 MB DOC)

Video S1 Video excerpts of seminar and deconstruction classes.
Found at: doi:10.1371/journal.pbio.1000264.s003 (18.04 MB MOV)

Video S2 Video excerpts of seminar and deconstruction classes.
Found at: doi:10.1371/journal.pbio.1000264.s004 (17.29 MB MOV)

Video S3 Video excerpts of seminar and deconstruction classes.
Found at: doi:10.1371/journal.pbio.1000264.s005 (17.11 MB MOV)

Video S4 Video excerpt of seminar and enhanced deconstruction class.
Found at: doi:10.1371/journal.pbio.1000264.s006 (14.03 MB MOV)

Acknowledgments

UB is an HHMI Professor, and we thank the HHMI Professors program for supporting this educational endeavor. We thank the many UCLA faculty who have participated in the course as invited speakers, the Bruincast team at the UCLA Office of Instructional Development for recording and webcasting classes, and the UCLA Life Sciences Instructional Computing service for assistance with course websites.

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Barney Schlinger: Lab GE course responses

1. How will your department participate in the GE curriculum for non-science majors during 2013-14 academic year? Please be specific.

My department has created a new GE course that has a lab component GE 7, course on Science and Food, with the lab component to be offered for the first time in 2013-14. In addition, we have modified PS 5 to make the lab component more rigorous and have worked to ensure that the course content addresses the scientific method in addition to teaching the material.

2. Do you believe the current science GE structure (2 Life Science, 2 Physical Science; 2 laboratory/demonstration courses, one in each area) is appropriate, or can the goals of the science GE curriculum be accomplished with the modified science GE structure (2 Life Science, 2 Physical Science; 1 laboratory/demonstration course, selected from either area)? Please explain your reasoning.

A poor lab course is likely worse than no offering at all. My sense is that the lack of appeal for science has to do with the perception that one has to have math skills to appreciate science. There is great beauty in many areas of science that should be exploit3ed better in science education. Perhaps a course could be designed that involved reading science literature written for the general public by accomplished science writers. Such a course might engage a population of students otherwise lost to us.

3. The cost of providing laboratory/demonstration experiences for GE students was a key factor leading to the suspension of the two-lab/demo requirement. Are there alternative, lower-cost options that might provide an equivalent experience in experimental science in your field (for example, computer-simulation-based labs)?

Computer-simulations two-dimensionalize multi-dimensional fields and I do not favor their use. Perhaps the university could develop internship programs with biotech, engineering or other firms that could apply for credit to satisfy a "lab" requirement.

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20 February 2013

Re: Foundations of Scientific Inquiry and the continued suspension of the second laboratory/demonstration requirement

Dear Faculty Executive Committee:

On November 5 2012, Departments in the life and Physical Sciences were asked to respond to three questions posed by the Foundation of Scientific Inquiry Self-Review Committee, which is responsible for submitting a self-study of the GE science curriculum in preparation for next year's Academic Senate review.

Below we have listed these questions and our responses.

1. How will your department participate in the GE curriculum for non-science majors during 2013-14 academic year? Please be specific.

The EEB GE courses that are scheduled in 2013-2014 are as follows:

FALL 2013: Taught by Alison Lipman, Temporary Lecturer
EEB 18. Why Ecology Matters: Science Behind Environmental Issues (5)
Lecture, three hours; discussion, two hours. Basic ecological concepts, scientific method, and ecological basis for local and global environmental issues. Major challenges to be faced in this century, including need to find interdisciplinary and collaborative solutions to world's worsening environmental problems (e.g., global climate change, biodiversity loss, deforestation, pollution, declining water resources, declining fisheries). Environmental literacy to equip students to become leaders in growing green economy and to help forge solutions to current and future environmental crises that threaten natural resource base. P/NP or letter grading. (80 seats)

FALL 2013: Taught by Jamie Lloyd-Smith, Michael Alfaro, and a third faculty yet to be named.
Life Science 1. Evolution, Ecology, and Biodiversity. (5) Lecture, three hours; laboratory, two hours; one field trip. Introduction to principles and mechanisms of evolution by natural selection; population, behavioral, and community ecology; and biodiversity, including major taxa and their evolutionary, ecological, and physiological relationships. P/NP or letter grading. (576 seats- although this is a mix of majors and GE)

WINTER 2014: TBA - Taught by Laura Jordan in Winter 2013, Winter 2012
25. Living Ocean (5)
Lecture, three hours; discussion, two hours; field trips, two hours. Not open for credit to students with credit for Earth and Space Sciences 15. Physical and chemical processes that take place in oceans, with emphasis on their effects on organisms. P/NP or letter grading. (80 seats)

SPRING 2014: Taught by Patricia Adair Gowaty and Stephen Hubbell
EEB 17. Evolution for Everyone (5)
Lecture, three hours; discussion, two hours. Exploration in detail of Darwinian natural selection, with emphasis on evidence and implications for modern problems people and societies face, including antibiotic resistance, insect resistance to pesticides, and coevolution of pollinators with crop plants. Nature of science in context of questions about ongoing real-time Darwinian processes. Letter grading. (80 seats)

2. Do you believe the current science GE structure (2 Life Science, 2 Physical Science; 2 laboratory/demonstration courses, one in each area) is appropriate, or can the goals of the science GE curriculum be accomplished with the modified science GE structure (2 Life Science, 2 Physical Science; 1 laboratory/demonstration course, selected from either area)? Please explain your reasoning.

Over the years our faculty have had long and lively debates over these requirements, with the overall consensus being that we support the current structure with 2 Life Science, 2 Physical Science; 2 laboratory/demonstration courses, one in each area. Life and physical sciences are very different and taking a balance between the 2 is optimal. However, we accept the practicality of the reduced requirement until the economy recovers and/or we develop some creative alternatives to standard expensive laboratory courses (see below).

3. The cost of providing laboratory/demonstration experiences for GE students was a key factor leading to the suspension of the two-lab/demo requirement. Are there alternative, lower-cost options that might provide an equivalent experience in experimental science in your field (for example, computer-simulation-based labs)?

We are have made some recent additions our GE curriculum and are reevaluating what we currently do in our discussion sections for several courses. Our course additions include EEB 17. Evolution for Everyone and EEB 18. Why Ecology Matters: Science Behind Environmental Issues. Both of these courses are 5 units and have a substantial "discussion section" of 2 hours per week. In section, students do projects and engage in computer simulations. Further, in discussion for one of our long standing courses, EEB 25. Marine Biology, students study live specimens and take several field trips. None of these courses are currently accepted as laboratory courses, and we are discussing whether they should be, since they clearly have many aspects of a laboratory and certainly go beyond a simple demonstration. They are truly experiential learning and we believe that this is what laboratory sections provide.

Please feel free to contact us if you require additional clarification.

Very Sincerely Yours,

Daniel T. Blumstein
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February 25, 2013

To: Troy Carter, Chair, Undergraduate Council
Michael Meranze, Chair, College Faculty Executive Committee

Dear Professors Carter and Meranze,

The following summarizes the Department of Earth & Space Sciences (ESS) contributions toward and views of General Education requirements in the Foundations of Scientific Inquiry area. The faculty of ESS are strongly committed to the concept of GE and to the specific goals of FSI, and it is our intent to continue to contribute strongly to teaching in this area. We have a relatively small number of undergraduate majors and our classes are typically not required for majors in the large science departments, so we do not have a large number of undergrads who need "service" courses. Thus, the bulk of our undergraduate teaching is in fact in GE classes, primarily populated by non-science students.

We have just concluded our self-assessment for an 8-year review and therefore I can provide some statistics to illustrate this point. Enrollments in ESS GE courses average ~2000 students per year, which constituted ~84% of total enrollments over the previous 8 academic years. Additional extra-departmental GE courses (e.g., GE70 cluster) were co-taught by ESS faculty to an average of ~400 students per year. Almost 90% of all our GE courses were taught by ladder faculty at all ranks, including many of our most prestigious members. In the previous academic year, this percentage has gone down somewhat as we have revived an old course ESS 17 ("Dinosaurs and their relatives") taught by adjunct faculty (Tony Friscia).

Answers to your specific questions are given here.

1. In the 2013-14 academic year we plan to offer:

Course	FSI credit	Quarters	Enrollment anticipated per quarter	Instructor
ESS 1 – Introduction to Earth Science	PS lab	2	75	ladder
ESS 3 - Astrobiology	PS / LS	1	115	
ESS 5 – Env. Geol. of Los Angeles	PS	1	25	
ESS 7 – Space Weather	PS	1	75	Adjunct
ESS 8 – Earthquakes	PS lab	3	125	ladder
ESS 9 – Solar System	PS	3	120	ladder
ESS 13 – Natural Disasters	PS	1	80	ladder
ESS 15 – Blue Planet	PS lab or LS lab	3	225	ladder

ESS 16 – Major Events in History of Life	LS or PS	1	100	ladder
ESS 17 – Dinosaurs	PS lab or LS lab	1	400	Adjunct
ESS 20 – Natural History SoCal	PS or LS	1	20	Emeritus

2. We believe that the current structure of the FSI requirement (2LS, 2PS, 2 lab/demo with 1 in each area) is appropriate. Dropping the laboratory/demo requirement to 1 class total is less than ideal, but it would be tolerable if proper resources (especially in LS) could not be marshaled. It is, however, very important to maintain the 2LS and 2PS course requirement.

3. We do utilize some computer-based simulation labs, but for each laboratory class there is either a field experience or actual laboratory exercises (or both). We are not aware of lower-cost options; the main cost for us is graduate student support (TA-ships). The availability of TA quarters is one factor limiting our GE enrollments, i.e., if we had more TA support, we could probably increase GE enrollments.

Sincerely,

Kevin D. McKeegan
Professor and Department Chair

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March 8, 2013

Dear Colleagues,

Thank you for your memo dated November 5, 2012, pertaining to GE requirements. The following is in response to the questions you posed to our Department, on behalf of myself and Chair Garcia-Garibay:

1. How will your department participate in the GE curriculum for non-science majors during 2013-14 academic year? Please be specific.

We are not currently offering any GE courses for non-science majors.

2. Do you believe the current science GE structure (2 Life Science, 2 Physical Science; 2 laboratory/demonstration courses, one in each area) is appropriate, or can the goals of the science GE curriculum be accomplished with the modified science GE structure (2 Life Science, 2 Physical Science; 1 laboratory/demonstration course, selected from either area)? Please explain your reasoning.

Either plan seems reasonable. In chemistry, we cannot offer any GE laboratory courses for non-science majors, as our instructional laboratory rooms are used throughout the day and during evenings.

3. The cost of providing laboratory/demonstration experiences for GE students was a key factor leading to the suspension of the two-lab/demo requirement. Are there alternative, lower-cost options that might provide an equivalent experience in experimental science in your field (for example, computer-simulation-based labs)?

In chemistry, this does not seem possible given our current resources. Our instructional laboratory rooms are occupied exhaustively, and computer-simulated labs for experimental chemistry are far from adequate.

Sincerely,

Neil K. Garg

MEMORANDUM

Department of Atmospheric & Oceanic Sciences
7127 Math Sciences Building
156505

TO: Troy Carter, Chair, Undergraduate Council
Michael Meranze, Chair, College Faculty Executive Committee

FR: J. David Neelin, Department Chair

DATE: February 12, 2013

RE: Foundation of Scientific Inquiry and the continued suspension of the second laboratory/demonstration requirement - Atmospheric & Oceanic Sciences Dept

This memorandum is the Department of Atmospheric & Oceanic Sciences' response to the November 5, 2012 Foundation of Scientific Inquiry and the continued suspension of the second laboratory/demonstration requirement.

1. How will your department participate in the GE curriculum for non-science majors during 2013-14 academic year? Please be specific.

The Department of Atmospheric and Oceanic Sciences (AOS) participates in the GE curriculum in two ways.

(1) By offering courses AOS 1, 2, and 3, along with their associated one-unit lab courses 1L, 2L, and 3L.
(2) By participating in the GE Cluster program (sequence M1, the Global Environment)

Our participation in 2013-14 is similar to that in the recent past. Like many departments, we have staffing shortages resulting from the economic recession that have yet to be restored. Combined with the success of our upper division course offerings, enrollments in which has increased substantially over the last decade, as well as issues with TA funding, we find ourselves struggling to allocate resources to our GE courses. However, we consider participation in the GE curriculum an important part of our service to the campus and the community at large, and furthermore we encourage and expect participation of our ladder faculty in this effort. The AOS department will do what is necessary to carry out our responsibility to the GE program.

2. Do you believe the current science GE structure (2 Life Science, 2 Physical Science; 2 laboratory/demonstration courses, one in each area) is appropriate, or can the goals of the science GE curriculum be accomplished with the modified science GE structure (2 Life Science, 2 Physical Science; 1 laboratory/demonstration course, selected from either area)? Please explain your reasoning.

AOS supports the compromise retaining four natural science courses but requiring only one formal laboratory class. Our guiding philosophy is that we should not allow perfect to be the enemy of the good.

In a world free of resource restraints, every science course should have a hands-on lab component, in which students discover concepts and test hypotheses in the manner that natural scientists do in their daily work. This is challenging to accomplish even in an environment of unlimited resources. That said, we should still be striving to incorporate this sense of discovery in our GE course offerings, even in classes not formally branded 'lab/demo'. In this way, we make the material more relevant, the learning more active, understanding more effective and complete.

3. The cost of providing laboratory/demonstration experiences for GE students was a key factor leading to the suspension of the two-lab/demo requirement. Are there alternative, lower-cost options that might provide an equivalent experience in experimental science in your field (for example, computer- simulation-based labs)?

In the face of real and daunting costs, we simply have to be creative enough to do more with less. The key principle underlying the lab/demo requirement is active learning: observation, experimentation, discovery. We should keep in mind that the value of a lab experience is not necessary related to its cost or complexity. Hands-on experiences may have little didactic value if they merely lead the student through recipe-like steps towards a foregone conclusion.

Simulation-based labs represent an excellent start, especially if they can be delivered via the web. The university should consider assisting GE programs with the programming and design challenges these labs would represent. Getting imaginative programmers together with talented scientists could accomplish a lot of good.

If you have any questions or need further information, please contact our Student Affairs Officer, Carol Yasutomi Fujino at Carolina@atmos.ucla.edu . Thank you.
po

CC: Suzanne Paulson, Department Vice Chair, Undergraduate Curriculum Committee
Robert G. Fovell, Undergraduate Curriculum Committee
Jeffrey Lew, Undergraduate Curriculum Committee
Carol Yasutomi Fujino, Student Affairs Officer

Appendix D – Curricular Data by Year

These are the basic data used to generate the graphs and tables in this report. The following data is given for every class receiving FSI credit for the study years (Fall 2005 through Summer 2012):

- **Term** – the quarter the course was offered. The first two digits are the calendar year. The final letter/number is for the quarter (F = Fall, W = Winter, S = Spring, 1 = Summer)

- **SubjArea** – the departmental listing for the course.

- **Catlg#** – the catalog number for the course.

- **Credit** – whether the course received Life (LS) or Physical (PS) science credit.

- **Wk 3 Enroll** – enrollment in the course, taken at Week 3.

- **Real Cap** – capacity for the course. This was either taken as the listed capacity from the registrar's records, or as the enrollment in the course for those courses where no capacity was listed (i.e., the capacity was listed as 0).

- **Non-BS** – the number of students enrolled who had not declared a B.S. major. This includes students with other declared majors (e.g., B.A.) as well as students who are 'undeclared'

- **Ladder** – whether the course was taught by a ladder faculty member(s).

- **Lab** – whether the course grants lab/demo credit.

Following the class-by-class data, summary data is given for each year. This was found either by parsing the raw data above or from other registrar data (in the case of Total Undergraduate Enrollment).

2005-2006 Academic Year

Term	SubjArea	Catlg#	Course Title	Credit	Wk 3 Enroll	Real Cap	Non-BS	Ladder	Lab
06W	A&O SCI	1	CLIMATE CHANGE	PS	178	180	154	Y	N
06S	A&O SCI	1	CLIMATE CHANGE	PS	75	150	64	Y	N
06W	A&O SCI	2	AIR POLLUTION	PS	332	336	293	N	N
05F	A&O SCI	2	AIR POLLUTION	PS	283	348	248	Y	N
06S	A&O SCI	2	AIR POLLUTION	PS	227	300	207	Y	N
061	A&O SCI	2	AIR POLLUTION	PS	13	13	10	N	N
06S	A&O SCI	3	INTR-ATMOS ENVIRMNT	PS	218	252	192	N	N
05F	A&O SCI	3	INTR-ATMOS ENVIRMNT	PS	216	252	196	N	N
06W	A&O SCI	3	INTR-ATMOS ENVIRMNT	PS	113	150	100	N	N
061	A&O SCI	3	INTR-ATMOS ENVIRMNT	PS	26	26	23	N	N
05F	A&O SCI	5	CLIMATS-OTHR WORLDS	PS	29	60	25	Y	N
06W	A&O SCI	1L	CLIMATE CHANGE LAB	PS	65	70	57	Y	Y
06S	A&O SCI	1L	CLIMATE CHANGE LAB	PS	24	60	23	Y	Y
06W	A&O SCI	2L	AIR POLLUTION LAB	PS	143	175	128	N	Y
05F	A&O SCI	2L	AIR POLLUTION LAB	PS	109	300	102	Y	Y
06S	A&O SCI	2L	AIR POLLUTION LAB	PS	81	300	75	Y	Y
061	A&O SCI	2L	AIR POLLUTION LAB	PS	5	5	3	N	Y
05F	A&O SCI	3L	INTR-ATMOS ENVR LAB	PS	91	300	83	N	Y
06S	A&O SCI	3L	INTR-ATMOS ENVR LAB	PS	85	300	73	N	Y
06W	A&O SCI	3L	INTR-ATMOS ENVR LAB	PS	49	175	45	N	Y
061	A&O SCI	3L	INTR-ATMOS ENVR LAB	PS	9	9	9	N	Y
06S	ANTHRO	7	HUMAN EVOLUTION	LS	334	334	287	Y	N
05F	ANTHRO	7	HUMAN EVOLUTION	LS	329	329	279	N	N
061	ANTHRO	7	HUMAN EVOLUTION	LS	80	120	60	Y	N
05F	ASTR	3	NATURE OF UNIVERSE	PS	423	423	384	Y	Y
06W	ASTR	3	NATURE OF UNIVERSE	PS	386	431	345	Y	Y
06S	ASTR	3	NATURE OF UNIVERSE	PS	368	430	326	Y	Y
061	ASTR	3	NATURE OF UNIVERSE	PS	22	35	22	Y	Y
06S	ASTR	4	BLACK HOLES	PS	90	114	73	Y	N
05F	ASTR	5	LIFE IN THE UNIVERS	PS	80	85	69	Y	N
06W	ASTR	5	LIFE IN THE UNIVERS	PS	64	70	52	Y	N
06W	ASTR	6	CHANG CNCPT-UNIVERS	PS	57	59	47	Y	N
06S	ASTR	6	CHANG CNCPT-UNIVERS	PS	41	43	34	Y	N
06W	CHEM	14A	EQUILBR&ACIDS&BASES	PS	697	700	364	N	N
05F	CHEM	14A	STRUCTRS&EQUILIBRIA	PS	695	700	337	N	N
061	CHEM	14A	EQUILBR&ACIDS&BASES	PS	96	140	74	N	N
06S	CHEM	14B	THRMDN&ELCTCHM&KNTC	PS	544	585	216	N	N
06W	CHEM	14B	THRMDN&ELCTCHM&KNTC	PS	532	700	207	N	N
061	CHEM	14B	THRMDN&ELCTCHM&KNTC	PS	41	100	22	N	N
06W	CHEM	14BL	GEN&ORGN CHEM LAB 1	PS	361	361	114	N	Y
06S	CHEM	14BL	GEN&ORGN CHEM LAB 1	PS	302	302	92	N	Y
05F	CHEM	14BL	GEN&ORGN CHEM LAB 1	PS	198	198	55	N	Y
061	CHEM	14BL	GEN&ORGN CHEM LAB 1	PS	163	163	70	N	Y
05F	CHEM	20A	CHEMICAL STRUCTURE	PS	847	935	213	Y	N
06W	CHEM	20A	CHEMICAL STRUCTURE	PS	108	235	43	Y	N
061	CHEM	20A	CHEMICAL STRUCTURE	PS	46	80	31	N	N
05F	CHEM	20AH	CHEM STRUCTURE-HNRS	PS	44	50	10	Y	N
06W	CHEM	20B	ENERGETICS&CHANGE	PS	591	591	113	Y	N
06S	CHEM	20B	ENERGETICS&CHANGE	PS	199	350	60	N	N
061	CHEM	20B	ENERGETICS&CHANGE	PS	63	75	24	Y	N
06W	CHEM	20BH	ENRGTCS&CHANGE-HNRS	PS	43	50	11	Y	N
06W	CHEM	20L	GENRL CHEMISTRY LAB	PS	357	357	46	N	Y
06S	CHEM	20L	GENRL CHEMISTRY LAB	PS	197	197	36	N	Y
05F	CHEM	20L	GENRL CHEMISTRY LAB	PS	107	107	38	N	Y
061	CHEM	20L	GENRL CHEMISTRY LAB	PS	38	40	13	N	Y
06S	CHEM	98TA	NANOTECHNOLOGY	PS	20	20	14	Y	N
06W	CHEM	98TB	OXYGEN	LS	12	15	7	N	N
05F	E&S SCI	1	INTRO TO EARTH SCI	PS	54	90	43	Y	N
06W	E&S SCI	1	INTRO TO EARTH SCI	PS	19	90	13	Y	N
05F	E&S SCI	3	ASTROBIOLOGY	PS	67	75	50	Y	N
05F	E&S SCI	5	ENVIRON GEOLOGY-L A	PS	61	75	55	N	N
06W	E&S SCI	7	SPACE WEATHER	PS	72	100	62	Y	N

Term	SubjArea	Catlg#	Course Title	Credit	Wk 3 Enroll	Real Cap	Non-BS	Ladder	Lab
06W	E&S SCI	8	EARTHQUAKES	PS	209	209	194	Y	Y
06S	E&S SCI	8	EARTHQUAKES	PS	186	186	172	N	Y
05F	E&S SCI	8	EARTHQUAKES	PS	177	177	167	Y	Y
05F	E&S SCI	9	SOLAR SYSTM&PLANETS	PS	87	87	81	Y	N
06S	E&S SCI	9	SOLAR SYSTM&PLANETS	PS	68	75	59	Y	N
06W	E&S SCI	9	SOLAR SYSTM&PLANETS	PS	64	75	57	Y	N
061	E&S SCI	9	SOLAR SYSTM&PLANETS	PS	19	60	17	N	N
06S	E&S SCI	10	EXPLORING MARS	PS	60	60	49	Y	N
06W	E&S SCI	15	INTROD-OCEANOGRAPHY	PS	397	397	345	Y	Y
05F	E&S SCI	15	INTROD-OCEANOGRAPHY	PS	375	375	303	Y	Y
06W	E&S SCI	16	MJR EVNTS-HIST LIFE	LS	69	92	50	Y	N
06S	E&S SCI	17	DINOSAURS&RELATIVES	LS	232	299	163	N	N
06S	E&S SCI	20	NAT HST-SOUTHRN CAL	PS	13	20	11	N	Y
05F	E&S SCI	1F	EARTH SCI-FIELDWORK	PS	38	44	31	Y	Y
06W	E&S SCI	1F	EARTH SCI-FIELDWORK	PS	23	60	20	Y	Y
061	EE BIOL	25	MARINE BIOLOGY	LS	8	40	8	N	N
05F	GE CLST	70A	COSMOS AND LIFE	PS	203	203	169	Y	Y
06W	GE CLST	70B	COSMOS AND LIFE	LS	172	200	147	Y	Y
06S	GE CLST	70CW	COSMOS AND LIFE	PS	116	132	99	N	N
06S	GE CLST	70DW	COSMOS AND LIFE	PS	42	44	37	N	N
05F	GE CLST	71A	BIOTECHNLGY&SOCIETY	LS	140	140	107	Y	N
06W	GE CLST	71B	BIOTECHNLGY&SOCIETY	LS	110	132	83	Y	Y
06W	GE CLST	80B	FRONTRS-HUMAN AGING	LS	151	160	89	Y	N
05F	GE CLST	M1A	GLOBAL ENVIRONMNT 1	PS	179	179	164	Y	Y
06W	GE CLST	M1B	GLOBAL ENVIRONMNT 2	LS	166	174	153	Y	Y
06W	GEOG	1	EARTH PHYS ENVIRONM	PS	82	100	73	Y	Y
05F	GEOG	2	BIODIVR-CHNGNG WRLD	LS	146	150	135	Y	Y
06W	GEOG	2	BIODIVR-CHNGNG WRLD	LS	92	100	75	Y	Y
061	GEOG	2	BIODIVR-CHNGNG WRLD	LS	50	100	37	N	Y
05F	GEOG	5	PEOPLE&EARTH ECOSYS	PS	233	233	217	Y	Y
06S	GEOG	5	PEOPLE&EARTH ECOSYS	PS	165	165	143	Y	Y
061	GEOG	5	PEOPLE&EARTH ECOSYS	PS	78	83	73	N	Y
06W	HNRS	14	SCIENCE AND SOCIETY	LS	18	22	12	Y	N
06S	HNRS	20	NATURE-MODERN SCI	PS	37	37	16	N	N
06S	HNRS	64	ART AND AESTHETICS	LS	25	25	15	N	N
06W	HNRS	70A	GEN ENGR-MED&AG&LAW	LS	42	52	31	Y	Y
05F	LIFESCI	1	EVOLUTN&ECOL&BIODIV	LS	699	720	305	Y	Y
06W	LIFESCI	1	EVOLUTN&ECOL&BIODIV	LS	616	648	290	Y	Y
06S	LIFESCI	1	EVOLUTN&ECOL&BIODIV	LS	547	624	260	Y	Y
061	LIFESCI	1	EVOLUTN&ECOL&BIODIV	LS	213	288	131	N	Y
05F	LIFESCI	2	CELLS&TISSUES&ORGNS	LS	530	576	169	Y	Y
06S	LIFESCI	2	CELLS&TISSUES&ORGNS	LS	505	505	198	Y	Y
06W	LIFESCI	2	CELLS&TISSUES&ORGNS	LS	463	576	159	Y	Y
061	LIFESCI	2	CELLS&TISSUES&ORGNS	LS	209	252	105	N	Y
06W	LIFESCI	15	LIFE-CONCPTS&ISSUES	LS	213	216	178	N	N
05F	LIFESCI	15	LIFE-CONCPTS&ISSUES	LS	211	216	188	N	N
06S	LIFESCI	15	LIFE-CONCPTS&ISSUES	LS	143	216	121	N	N
05F	LING	1	INTR-STUDY-LANGUAGE	LS	394	394	322	Y	N
06W	LING	1	INTR-STUDY-LANGUAGE	LS	327	327	243	Y	N
06S	LING	1	INTR-STUDY-LANGUAGE	LS	325	330	233	Y	N
061	LING	1	INTR-STUDY-LANGUAGE	LS	84	84	50	N	N
05F	MCD BIO	30	BIOLOGY OF CANCER	LS	250	250	174	N	N
061	MCD BIO	30	BIOLOGY OF CANCER	LS	75	120	61	N	N
06S	MCD BIO	40	AIDS&SEXUAL TRANSMT	LS	277	277	202	N	N
06W	MCD BIO	40	AIDS&SEXUAL TRANSMT	LS	264	266	163	N	N
05F	MCD BIO	40	AIDS&SEXUAL TRANSMT	LS	254	256	188	N	N
061	MCD BIO	40	AIDS&SEXUAL TRANSMT	LS	64	120	49	N	N
06S	MIMG	6	INTRO MICROBIOLOGY	LS	75	250	47	N	N
05F	MIMG	6	INTRO MICROBIOLOGY	LS	53	100	34	Y	N
06W	MIMG	12	BIOTERRORISM	LS	202	280	138	N	N
061	MIMG	12	BIOTERRORISM	LS	40	108	33	N	N
05F	NEUROSC	10	NEUROSCI-21ST CENT	LS	62	100	49	N	N
05F	PHILOS	8	INTRO-PHILOS OF SCI	PS	226	226	181	Y	N
061	PHY SCI	3	INTRO-HUMAN PHYSIOL	LS	120	142	62	N	Y

Term	SubjArea	Catlg#	Course Title	Credit	Wk 3 Enroll	Real Cap	Non-BS	Ladder	Lab
06S	PHY SCI	5	HMN PHYS-DIET&EXRCS	LS	449	452	366	N	Y
06W	PHY SCI	5	HMN PHYS-DIET&EXRCS	LS	435	437	361	N	Y
05F	PHY SCI	5	HMN PHYS-DIET&EXRCS	LS	422	423	353	Y	Y
061	PHY SCI	5	HMN PHYS-DIET&EXRCS	LS	76	100	54	N	Y
061	PHY SCI	13	INTRO-HUMAN ANATOMY	LS	46	60	12	N	Y
06W	PHYSICS	10	PHYSICS	PS	193	234	178	Y	N
05F	PHYSICS	10	PHYSICS	PS	175	175	158	Y	N
06S	PHYSICS	10	PHYSICS	PS	113	165	96	Y	N
061	PHYSICS	10	PHYSICS	PS	77	91	74	N	N
06W	PHYSICS	1A	MECHANICS	PS	392	392	67	Y	Y
06S	PHYSICS	1A	MECHANICS	PS	153	153	38	N	Y
05F	PHYSICS	1A	MECHANICS	PS	151	171	67	Y	Y
061	PHYSICS	1A	MECHANICS	PS	38	48	29	Y	Y
05F	PHYSICS	1AH	MECHANICS-HONORS	PS	25	40	5	Y	Y
06S	PHYSICS	1B	OSCILTNS&WAVES&FLDS	PS	346	386	43	Y	Y
05F	PHYSICS	1B	OSCILTNS&WAVES&FLDS	PS	142	150	20	Y	Y
06W	PHYSICS	1B	OSCILTNS&WAVES&FLDS	PS	105	192	17	N	Y
061	PHYSICS	1B	OSCILTNS&WAVES&FLDS	PS	50	96	36	N	Y
06W	PHYSICS	1BH	OSCLTN&WAV&FLD-HNRS	PS	20	43	3	Y	Y
05F	PHYSICS	1C	ELECTRODYNMC&OPTICS	PS	204	268	24	Y	Y
06W	PHYSICS	1C	ELECTRODYNMC&OPTICS	PS	103	193	13	Y	Y
06S	PHYSICS	1C	ELECTRODYNMC&OPTICS	PS	78	171	17	Y	Y
061	PHYSICS	1C	ELECTRODYNMC&OPTICS	PS	40	55	13	Y	Y
06S	PHYSICS	1CH	ELECDYNM&OPTCS-HNRS	PS	16	35	2	Y	Y
05F	PHYSICS	6A	PHYSIC-LIFE SCI MAJ	PS	568	579	195	Y	Y
06W	PHYSICS	6A	PHYSIC-LIFE SCI MAJ	PS	382	386	141	Y	Y
06S	PHYSICS	6A	PHYSIC-LIFE SCI MAJ	PS	345	348	128	Y	Y
061	PHYSICS	6A	PHYSIC-LIFE SCI MAJ	PS	178	200	89	N	Y
05F	PHYSICS	6AH	STATICS & DYNAMICS	PS	110	110	35	Y	Y
05F	PHYSICS	6B	PHYSIC-LIFE SCI MAJ	PS	396	448	94	Y	Y
06S	PHYSICS	6B	PHYSIC-LIFE SCI MAJ	PS	380	386	72	N	Y
06W	PHYSICS	6B	PHYSIC-LIFE SCI MAJ	PS	346	511	86	Y	Y
061	PHYSICS	6B	PHYSIC-LIFE SCI MAJ	PS	180	230	53	N	Y
06W	PHYSICS	6BH	SOUND&LIGHT&HYDRDYN	PS	116	116	15	Y	Y
06S	PHYSICS	6C	PHYSIC-LIFE SCI MAJ	PS	419	574	70	Y	Y
06W	PHYSICS	6C	PHYSIC-LIFE SCI MAJ	PS	315	340	62	N	Y
05F	PHYSICS	6C	PHYSIC-LIFE SCI MAJ	PS	308	337	37	N	Y
061	PHYSICS	6C	PHYSIC-LIFE SCI MAJ	PS	108	133	23	N	Y
06S	PHYSICS	6CH	ELCTRC&MAGNT&TRNSPT	PS	121	121	13	Y	Y
05F	PSYCH	15	INTRO PSYCHOBIOLOGY	LS	300	300	252	N	N
06W	PSYCH	15	INTRO PSYCHOBIOLOGY	LS	169	169	111	Y	N
061	PSYCH	15	INTRO PSYCHOBIOLOGY	LS	36	36	30	N	N
06S	STATS	10	INTRO-STAT REASON	PS	445	445	347	Y	N
06W	STATS	10	INTRO-STAT REASON	PS	401	401	344	N	N
061	STATS	10	INTRO-STAT REASON	PS	217	224	183	N	N

Summary Data for 2005-2006

Total Enrollment in all FSI Courses	32621
Total Number of Courses	184
Total Number of PS courses	118
Total Number of LS courses	66
Total Number of Lab/Demo Courses	87
Total Number of courses taught by ladder faculty	94
Total Undergraduate Enrollment	23875

2006-2007 Academic Year

Term	SubjArea	Catlg#	Course Title	Credit	Wk 3 Enroll	Real Cap	Non-BS	Ladder	Lab
06F	A&O SCI	1	CLIMATE CHANGE	PS	178	180	154	Y	N
07S	A&O SCI	1	CLIMATE CHANGE	PS	57	150	52	Y	N
071	A&O SCI	1	CLIMATE CHANGE	PS	25	25	18	N	N
07W	A&O SCI	2	AIR POLLUTION	PS	332	336	293	N	N
06F	A&O SCI	2	AIR POLLUTION	PS	245	252	215	N	N
07S	A&O SCI	2	AIR POLLUTION	PS	63	225	55	Y	N
071	A&O SCI	2	AIR POLLUTION	PS	40	40	37	N	N
06F	A&O SCI	3	INTR-ATMOS ENVIRMNT	PS	188	225	162	N	N
07S	A&O SCI	3	INTR-ATMOS ENVIRMNT	PS	182	233	159	N	N
07W	A&O SCI	3	INTR-ATMOS ENVIRMNT	PS	67	150	57	N	N
071	A&O SCI	3	INTR-ATMOS ENVIRMNT	PS	50	50	44	N	N
06F	A&O SCI	1L	CLIMATE CHANGE LAB	PS	70	125	61	Y	Y
07S	A&O SCI	1L	CLIMATE CHANGE LAB	PS	20	75	20	Y	Y
071	A&O SCI	1L	CLIMATE CHANGE LAB	PS	10	10	7	N	Y
07W	A&O SCI	2L	AIR POLLUTION LAB	PS	159	175	145	N	Y
06F	A&O SCI	2L	AIR POLLUTION LAB	PS	121	300	107	N	Y
07S	A&O SCI	2L	AIR POLLUTION LAB	PS	30	150	24	Y	Y
071	A&O SCI	2L	AIR POLLUTION LAB	PS	20	20	18	N	Y
06F	A&O SCI	3L	INTR-ATMOS ENVR LAB	PS	93	300	86	N	Y
07S	A&O SCI	3L	INTR-ATMOS ENVR LAB	PS	66	150	60	N	Y
07W	A&O SCI	3L	INTR-ATMOS ENVR LAB	PS	27	175	23	N	Y
071	A&O SCI	3L	INTR-ATMOS ENVR LAB	PS	14	14	14	N	Y
07W	ANTHRO	7	HUMAN EVOLUTION	LS	351	351	304	Y	N
06F	ANTHRO	7	HUMAN EVOLUTION	LS	345	345	291	Y	N
071	ANTHRO	7	HUMAN EVOLUTION	LS	47	47	42	N	N
07S	ANTHRO	12	HMN EVLTN-COMP ANLY	LS	135	136	106	Y	N
07S	ANTHRO	98T	IMPROV&LNG&INTERACT	LS	20	20	13	N	N
07W	ANTHRO	98T	EVOL&ECON-COOPERATN	LS	17	18	10	N	N
07W	ASTR	3	NATURE OF UNIVERSE	PS	432	432	391	Y	Y
06F	ASTR	3	NATURE OF UNIVERSE	PS	398	429	359	Y	Y
07S	ASTR	3	NATURE OF UNIVERSE	PS	304	420	267	Y	Y
071	ASTR	3	NATURE OF UNIVERSE	PS	18	35	17	Y	Y
06F	ASTR	4	BLACK HOLES	PS	77	80	69	Y	N
07S	ASTR	4	BLACK HOLES	PS	69	70	59	Y	N
06F	ASTR	5	LIFE IN THE UNIVERS	PS	83	85	60	Y	N
07W	ASTR	5	LIFE IN THE UNIVERS	PS	74	75	52	Y	N
07W	ASTR	6	CHANG CNCPT-UNIVERS	PS	99	100	80	Y	N
07S	ASTR	6	CHANG CNCPT-UNIVERS	PS	27	50	23	Y	N
07S	BIOMATH	98T	HUMN BDY-BMED RESCH	LS	14	15	9	N	N
07S	CHEM	2	INTRODUCTORY CHEM	PS	21	40	17	Y	N
06F	E&S SCI	1	INTRO TO EARTH SCI	PS	70	90	57	Y	N
07W	E&S SCI	1	INTRO TO EARTH SCI	PS	31	90	20	Y	N
07S	E&S SCI	3	ASTROBIOLOGY	PS	72	75	53	Y	N
07W	E&S SCI	5	ENVIRON GEOLOGY-L A	PS	38	75	32	N	N
06F	E&S SCI	7	SPACE WEATHER	PS	99	110	87	Y	N
07S	E&S SCI	8	EARTHQUAKES	PS	232	360	208	Y	Y
06F	E&S SCI	8	EARTHQUAKES	PS	185	185	170	N	Y
07W	E&S SCI	8	EARTHQUAKES	PS	117	117	108	Y	Y
071	E&S SCI	8	EARTHQUAKES	PS	15	60	14	N	Y
06F	E&S SCI	9	SOLAR SYSTM&PLANETS	PS	114	120	103	Y	N
07S	E&S SCI	9	SOLAR SYSTM&PLANETS	PS	64	75	55	Y	N
07W	E&S SCI	9	SOLAR SYSTM&PLANETS	PS	60	75	53	Y	N
071	E&S SCI	9	SOLAR SYSTM&PLANETS	PS	13	60	13	N	N
07W	E&S SCI	10	EXPLORING MARS	PS	39	75	28	Y	N
07W	E&S SCI	15	INTROD-OCEANOGRAPHY	PS	435	435	386	Y	Y
06F	E&S SCI	15	INTROD-OCEANOGRAPHY	PS	386	386	304	Y	Y
07S	E&S SCI	15	INTROD-OCEANOGRAPHY	PS	226	300	174	N	Y
07W	E&S SCI	16	MJR EVNTS-HIST LIFE	LS	86	92	67	Y	N
07S	E&S SCI	17	DINOSAURS&RELATIVES	LS	208	208	163	N	N
07S	E&S SCI	20	NAT HST-SOUTHRN CAL	PS	9	20	5	N	Y
07W	E&S SCI	1F	EARTH SCI-FIELDWORK	PS	24	60	21	Y	Y
06F	E&S SCI	1F	EARTH SCI-FIELDWORK	PS	19	60	14	Y	Y

Term	SubjArea	Catlg#	Course Title	Credit	Wk 3 Enroll	Real Cap	Non-BS	Ladder	Lab
07S	EE BIOL	13	EVOLUTION OF LIFE	LS	27	50	17	Y	N
07W	EE BIOL	98T	ELASMOBRNCH BIOLOGY	LS	19	19	14	N	N
06F	GE CLST	70A	COSMOS AND LIFE	PS	200	200	164	Y	Y
07W	GE CLST	70B	COSMOS AND LIFE	LS	171	200	141	Y	Y
07S	GE CLST	70CW	COSMOS AND LIFE	LS	82	110	65	Y	N
07S	GE CLST	70DW	COSMOS AND LIFE	PS	84	88	72	Y	N
06F	GE CLST	71A	BIOTECHNLGY&SOCIETY	LS	138	144	114	N	Y
07W	GE CLST	71B	BIOTECHNLGY&SOCIETY	LS	117	132	98	N	Y
06F	GE CLST	72A	SEX-BIOLOGY-SOCIETY	LS	196	200	146	Y	N
06F	GE CLST	80A	FRONTRS-HUMAN AGING	LS	165	165	109	N	N
06F	GE CLST	M1A	GLOBAL ENVIRONMNT 1	PS	177	177	164	Y	Y
07W	GE CLST	M1B	GLOBAL ENVIRONMNT 2	LS	173	176	162	Y	Y
06F	GEOG	1	EARTH PHYS ENVIRONM	PS	92	100	81	Y	Y
071	GEOG	1	EARTH PHYS ENVIRONM	PS	23	80	21	N	Y
06F	GEOG	2	BIODIVR-CHNGNG WRLD	LS	155	155	146	Y	Y
07W	GEOG	2	BIODIVR-CHNGNG WRLD	LS	68	100	46	Y	Y
071	GEOG	2	BIODIVR-CHNGNG WRLD	LS	62	100	51	N	Y
07W	GEOG	5	PEOPLE&EARTH ECOSYS	PS	299	300	277	Y	Y
07S	GEOG	5	PEOPLE&EARTH ECOSYS	PS	204	204	185	N	Y
071	GEOG	5	PEOPLE&EARTH ECOSYS	PS	76	100	61	N	Y
07W	HNRS	14	SCIENCE AND SOCIETY	LS	20	21	14	Y	N
07S	HNRS	20	NATURE-MODERN SCI	PS	34	34	24	N	N
07S	HNRS	64	ART AND AESTHETICS	LS	22	22	14	N	N
06F	LIFESCI	1	EVOLUTN&ECOL&BIODIV	LS	564	720	258	Y	Y
07W	LIFESCI	1	EVOLUTN&ECOL&BIODIV	LS	557	720	246	Y	Y
07S	LIFESCI	1	EVOLUTN&ECOL&BIODIV	LS	501	576	232	N	Y
071	LIFESCI	1	EVOLUTN&ECOL&BIODIV	LS	237	288	114	N	Y
06F	LIFESCI	15	LIFE-CONCPTS&ISSUES	LS	216	216	192	N	N
07S	LIFESCI	15	LIFE-CONCPTS&ISSUES	LS	175	216	159	N	N
07W	LIFESCI	15	LIFE-CONCPTS&ISSUES	LS	114	216	95	N	N
06F	LING	1	INTR-STUDY-LANGUAGE	LS	385	385	289	N	N
07S	LING	1	INTR-STUDY-LANGUAGE	LS	380	380	273	Y	N
07W	LING	1	INTR-STUDY-LANGUAGE	LS	367	367	254	Y	N
071	LING	1	INTR-STUDY-LANGUAGE	LS	98	98	58	N	N
06F	MCD BIO	40	AIDS&SEXUAL TRANSMT	LS	221	225	176	Y	N
07S	MCD BIO	40	AIDS&SEXUAL TRANSMT	LS	71	100	53	N	N
071	MCD BIO	40	AIDS&SEXUAL TRANSMT	LS	14	14	11	N	N
07S	MCD BIO	50	STEM CELL BIO&PLTCS	LS	161	180	58	N	N
071	MCD BIO	50	STEM CELL BIO&PLTCS	LS	95	130	80	N	N
07W	MCD BIO	50	STEM CELL BIO&PLTCS	LS	23	60	7	N	N
07S	MCD BIO	80	PLANT BIO-NOW&FUTUR	LS	45	45	38	Y	Y
06F	MIMG	6	INTRO MICROBIOLOGY	LS	82	120	56	N	N
07S	MIMG	6	INTRO MICROBIOLOGY	LS	52	175	35	Y	N
07W	MIMG	12	BIOTERRORISM	LS	242	280	164	N	N
07S	MIMG	12	BIOTERRORISM	LS	160	170	116	N	N
071	MIMG	12	BIOTERRORISM	LS	63	108	57	N	N
06F	NEUROSC	10	NEUROSCI-21ST CENT	LS	122	122	89	N	N
07W	PHILOS	8	INTRO-PHILOS OF SCI	PS	223	223	157	Y	N
071	PHY SCI	3	INTRO-HUMAN PHYSIOL	LS	132	144	68	N	Y
07W	PHY SCI	5	HMN PHYS-DIET&EXRCS	LS	460	460	368	N	Y
07S	PHY SCI	5	HMN PHYS-DIET&EXRCS	LS	450	450	380	N	Y
06F	PHY SCI	5	HMN PHYS-DIET&EXRCS	LS	421	425	368	Y	Y
071	PHY SCI	5	HMN PHYS-DIET&EXRCS	LS	100	100	81	N	Y
071	PHY SCI	13	INTRO-HUMAN ANATOMY	LS	57	60	31	N	Y
06F	PHYSICS	10	PHYSICS	PS	172	175	163	Y	N
07S	PHYSICS	10	PHYSICS	PS	151	167	139	Y	N
07W	PHYSICS	10	PHYSICS	PS	126	126	117	Y	N
071	PHYSICS	10	PHYSICS	PS	37	91	36	N	N
06F	PSYCH	15	INTRO PSYCHOBIOLOGY	LS	275	275	236	N	N
07W	PSYCH	15	INTRO PSYCHOBIOLOGY	LS	155	155	115	Y	N
07S	PSYCH	15	INTRO PSYCHOBIOLOGY	LS	90	100	58	N	N
071	PSYCH	15	INTRO PSYCHOBIOLOGY	LS	51	51	44	N	N
06F	STATS	10	INTRO-STAT REASON	PS	551	596	452	N	N

Term	SubjArea	Catlg#	Course Title	Credit	Wk 3 Enroll	Real Cap	Non-BS	Ladder	Lab
07S	STATS	10	INTRO-STAT REASON	PS	535	535	454	N	N
07W	STATS	10	INTRO-STAT REASON	PS	368	368	295	N	N
071	STATS	10	INTRO-STAT REASON	PS	232	232	189	N	N
06F	LIFESCI	2	CELLS&TISSUES&ORGNS	LS	497	576	167	Y	Y
07W	LIFESCI	2	CELLS&TISSUES&ORGNS	LS	493	576	129	Y	Y
07S	LIFESCI	2	CELLS&TISSUES&ORGNS	LS	463	504	130	Y	Y
071	LIFESCI	2	CELLS&TISSUES&ORGNS	LS	200	216	82	N	Y
07W	CHEM	14BL	GEN&ORGN CHEM LAB 1	PS	388	388	124	N	Y
07S	CHEM	14BL	GEN&ORGN CHEM LAB 1	PS	279	279	85	N	Y
06F	CHEM	14BL	GEN&ORGN CHEM LAB 1	PS	194	194	51	N	Y
071	CHEM	14BL	GEN&ORGN CHEM LAB 1	PS	154	160	76	N	Y
07W	CHEM	20L	GENRL CHEMISTRY LAB	PS	361	361	43	N	Y
07S	CHEM	20L	GENRL CHEMISTRY LAB	PS	200	200	28	N	Y
06F	CHEM	20L	GENRL CHEMISTRY LAB	PS	91	91	18	N	Y
071	CHEM	20L	GENRL CHEMISTRY LAB	PS	35	40	7	N	Y
07W	PHYSICS	1A	MECHANICS	PS	416	416	66	Y	Y
07S	PHYSICS	1A	MECHANICS	PS	175	177	41	N	Y
06F	PHYSICS	1A	MECHANICS	PS	145	171	43	N	Y
071	PHYSICS	1A	MECHANICS	PS	45	48	26	Y	Y
06F	PHYSICS	1AH	MECHANICS-HONORS	PS	18	40	2	Y	Y
07S	PHYSICS	1B	OSCILTNS&WAVES&FLDS	PS	377	389	32	Y	Y
07W	PHYSICS	1B	OSCILTNS&WAVES&FLDS	PS	165	192	27	Y	Y
06F	PHYSICS	1B	OSCILTNS&WAVES&FLDS	PS	157	171	22	Y	Y
071	PHYSICS	1B	OSCILTNS&WAVES&FLDS	PS	76	96	39	N	Y
07W	PHYSICS	1BH	OSCLTN&WAV&FLD-HNRS	PS	18	43	4	Y	Y
06F	PHYSICS	1C	ELECTRODYNMC&OPTICS	PS	241	241	25	Y	Y
07W	PHYSICS	1C	ELECTRODYNMC&OPTICS	PS	124	193	19	N	Y
07S	PHYSICS	1C	ELECTRODYNMC&OPTICS	PS	102	171	15	N	Y
071	PHYSICS	1C	ELECTRODYNMC&OPTICS	PS	44	55	18	Y	Y
07S	PHYSICS	1CH	ELECDYNM&OPTCS-HNRS	PS	15	35	1	Y	Y
06F	PHYSICS	6A	PHYSIC-LIFE SCI MAJ	PS	574	579	187	N	Y
07W	PHYSICS	6A	PHYSIC-LIFE SCI MAJ	PS	379	386	123	Y	Y
07S	PHYSICS	6A	PHYSIC-LIFE SCI MAJ	PS	335	342	120	N	Y
071	PHYSICS	6A	PHYSIC-LIFE SCI MAJ	PS	212	260	109	N	Y
06F	PHYSICS	6AH	STATICS & DYNAMICS	PS	82	117	25	Y	Y
07W	PHYSICS	6B	PHYSIC-LIFE SCI MAJ	PS	480	530	113	N	Y
06F	PHYSICS	6B	PHYSIC-LIFE SCI MAJ	PS	383	480	86	Y	Y
07S	PHYSICS	6B	PHYSIC-LIFE SCI MAJ	PS	350	386	85	Y	Y
071	PHYSICS	6B	PHYSIC-LIFE SCI MAJ	PS	204	242	91	N	Y
07W	PHYSICS	6BH	SOUND&LIGHT&HYDRDYN	PS	98	112	21	Y	Y
07S	PHYSICS	6C	PHYSIC-LIFE SCI MAJ	PS	537	564	83	Y	Y
06F	PHYSICS	6C	PHYSIC-LIFE SCI MAJ	PS	334	386	40	Y	Y
07W	PHYSICS	6C	PHYSIC-LIFE SCI MAJ	PS	305	340	55	Y	Y
071	PHYSICS	6C	PHYSIC-LIFE SCI MAJ	PS	111	165	28	N	Y
07S	PHYSICS	6CH	ELCTRC&MAGNT&TRNSPT	PS	92	117	14	Y	Y
06F	CHEM	14A	EQUILBR&ACIDS&BASES	PS	1032	1050	394	N	N
07W	CHEM	14A	EQUILBR&ACIDS&BASES	PS	580	700	315	N	N
071	CHEM	14A	EQUILBR&ACIDS&BASES	PS	101	120	76	N	N
07W	CHEM	14B	THRMDN&ELCTCHM&KNTC	PS	891	1050	307	N	N
07S	CHEM	14B	THRMDN&ELCTCHM&KNTC	PS	491	585	218	N	N
071	CHEM	14B	THRMDN&ELCTCHM&KNTC	PS	92	100	54	N	N
06F	CHEM	20A	CHEMICAL STRUCTURE	PS	861	861	180	Y	N
07W	CHEM	20A	CHEMICAL STRUCTURE	PS	186	235	67	Y	N
071	CHEM	20A	CHEMICAL STRUCTURE	PS	60	80	31	N	N
06F	CHEM	20AH	CHEM STRUCTURE-HNRS	PS	46	50	4	Y	N
07W	CHEM	20B	ENERGETICS&CHANGE	PS	505	585	76	Y	N
07S	CHEM	20B	ENERGETICS&CHANGE	PS	228	235	63	Y	N
071	CHEM	20B	ENERGETICS&CHANGE	PS	57	100	26	N	N
07W	CHEM	20BH	ENRGTCS&CHANGE-HNRS	PS	75	75	14	Y	N

Summary Data for 2006-2007

Total Enrollment in all FSI Courses	34419	Total Number of Lab/Demo Courses	92
Total Number of Courses	198	Total Number of courses by lad. fac.	89
Total Number of PS courses	123	Total Undergraduate Enrollment	24522
Total Number of LS courses	75		

2007-2008 Academic Year

Term	SubjArea	Catlg#	Course Title	Credit	Wk 3 Enroll	Real Cap	Non-BS	Ladder	Lab
08S	A&O SCI	1	CLIMATE CHANGE	PS	152	152	126	Y	N
07F	A&O SCI	1	CLIMATE CHANGE	PS	76	81	67	Y	N
08W	A&O SCI	1	CLIMATE CHANGE	PS	73	75	67	Y	N
081	A&O SCI	1	CLIMATE CHANGE	PS	27	27	23	N	N
08W	A&O SCI	2	AIR POLLUTION	PS	249	252	209	N	N
07F	A&O SCI	2	AIR POLLUTION	PS	147	225	128	Y	N
08S	A&O SCI	2	AIR POLLUTION	PS	130	150	101	Y	N
081	A&O SCI	2	AIR POLLUTION	PS	41	41	31	N	N
08S	A&O SCI	3	INTR-ATMOS ENVIRMNT	PS	188	189	159	N	N
07F	A&O SCI	3	INTR-ATMOS ENVIRMNT	PS	122	225	95	N	N
08W	A&O SCI	3	INTR-ATMOS ENVIRMNT	PS	103	150	82	N	N
081	A&O SCI	3	INTR-ATMOS ENVIRMNT	PS	47	47	35	N	N
08S	A&O SCI	1L	CLIMATE CHANGE LAB	PS	63	100	52	Y	Y
07F	A&O SCI	1L	CLIMATE CHANGE LAB	PS	25	50	21	Y	Y
08W	A&O SCI	1L	CLIMATE CHANGE LAB	PS	21	50	18	Y	Y
081	A&O SCI	1L	CLIMATE CHANGE LAB	PS	14	14	13	N	Y
08W	A&O SCI	2L	AIR POLLUTION LAB	PS	133	175	111	N	Y
07F	A&O SCI	2L	AIR POLLUTION LAB	PS	51	200	47	Y	Y
08S	A&O SCI	2L	AIR POLLUTION LAB	PS	42	150	33	Y	Y
081	A&O SCI	2L	AIR POLLUTION LAB	PS	17	17	12	N	Y
08S	A&O SCI	3L	INTR-ATMOS ENVR LAB	PS	91	150	77	N	Y
07F	A&O SCI	3L	INTR-ATMOS ENVR LAB	PS	52	200	41	N	Y
08W	A&O SCI	3L	INTR-ATMOS ENVR LAB	PS	32	175	28	N	Y
081	A&O SCI	3L	INTR-ATMOS ENVR LAB	PS	19	19	16	N	Y
08W	ANTHRO	7	HUMAN EVOLUTION	LS	335	335	287	Y	N
08S	ANTHRO	7	HUMAN EVOLUTION	LS	300	300	219	Y	N
081	ANTHRO	7	HUMAN EVOLUTION	LS	38	60	29	N	N
07F	ANTHRO	12	HMN EVLTN-COMP ANLY	LS	157	157	128	Y	N
07F	ASTR	3	NATURE OF UNIVERSE	PS	368	420	308	Y	Y
08W	ASTR	3	NATURE OF UNIVERSE	PS	310	364	253	Y	Y
08S	ASTR	3	NATURE OF UNIVERSE	PS	245	280	195	Y	Y
08S	ASTR	4	BLACK HOLES	PS	75	80	63	Y	N
07F	ASTR	4	BLACK HOLES	PS	72	80	64	Y	N
081	ASTR	4	BLACK HOLES	PS	15	15	13	Y	N
08W	ASTR	5	LIFE IN THE UNIVERS	PS	85	85	62	Y	N
07F	ASTR	5	LIFE IN THE UNIVERS	PS	81	85	51	Y	N
081	ASTR	5	LIFE IN THE UNIVERS	PS	62	62	46	N	N
08S	ASTR	6	CHANG CNCPT-UNIVERS	PS	34	50	22	Y	N
08W	ASTR	6	CHANG CNCPT-UNIVERS	PS	23	100	17	Y	N
07F	E&S SCI	1	INTRO TO EARTH SCI	PS	49	90	30	Y	N
07F	E&S SCI	5	ENVIRON GEOLOGY-L A	PS	22	60	20	N	N
08S	E&S SCI	7	SPACE WEATHER	PS	110	117	88	Y	N
08W	E&S SCI	8	EARTHQUAKES	PS	202	202	181	Y	Y
07F	E&S SCI	8	EARTHQUAKES	PS	184	184	169	N	Y
08S	E&S SCI	8	EARTHQUAKES	PS	104	132	85	N	Y
081	E&S SCI	8	EARTHQUAKES	PS	13	60	11	N	Y
07F	E&S SCI	9	SOLAR SYSTM&PLANETS	PS	117	120	94	Y	N
08W	E&S SCI	9	SOLAR SYSTM&PLANETS	PS	65	75	52	Y	N
08S	E&S SCI	9	SOLAR SYSTM&PLANETS	PS	50	75	37	Y	N
081	E&S SCI	9	SOLAR SYSTM&PLANETS	PS	18	60	15	N	N
08S	E&S SCI	10	EXPLORING MARS	PS	61	61	48	Y	N
08W	E&S SCI	15	INTROD-OCEANOGRAPHY	PS	365	375	273	Y	Y
07F	E&S SCI	15	INTROD-OCEANOGRAPHY	PS	323	375	251	N	Y
08W	E&S SCI	16	MJR EVNTS-HIST LIFE	LS	91	92	62	Y	N
08S	E&S SCI	17	DINOSAURS&RELATIVES	LS	294	294	191	N	N
08S	E&S SCI	20	NAT HST-SOUTHRN CAL	PS	9	9	9	N	Y
07F	E&S SCI	1F	EARTH SCI-FIELDWORK	PS	12	60	10	Y	Y
08W	EE BIOL	13	EVOLUTION OF LIFE	LS	49	50	26	Y	N
07F	GE CLST	70A	COSMOS AND LIFE	PS	194	200	141	Y	Y
08W	GE CLST	70B	COSMOS AND LIFE	LS	180	200	131	Y	Y
08S	GE CLST	70CW	COSMOS AND LIFE	LS	120	140	82	Y	N
08S	GE CLST	70DW	COSMOS AND LIFE	PS	48	48	42	N	N

Term	SubjArea	Catlg#	Course Title	Credit	Wk 3 Enroll	Real Cap	Non-BS	Ladder	Lab
07F	GE CLST	72A	SEX-BIOLOGY-SOCIETY	LS	194	200	98	Y	N
07F	GE CLST	80A	FRONTRS-HUMAN AGING	LS	156	160	68	N	N
07F	GE CLST	M1A	GLOBAL ENVIRONMNT 1	PS	174	174	137	Y	Y
08W	GE CLST	M1B	GLOBAL ENVIRONMNT 2	LS	153	176	125	Y	Y
07F	GEOG	1	EARTH PHYS ENVIRONM	PS	90	100	80	Y	Y
07F	GEOG	2	BIODIVR-CHNGNG WRLD	LS	148	150	129	Y	Y
08W	GEOG	2	BIODIVR-CHNGNG WRLD	LS	99	100	84	N	Y
081	GEOG	2	BIODIVR-CHNGNG WRLD	LS	44	100	37	N	Y
07F	GEOG	5	PEOPLE&EARTH ECOSYS	PS	294	294	268	Y	Y
08S	GEOG	5	PEOPLE&EARTH ECOSYS	PS	267	267	241	Y	Y
08W	GEOG	5	PEOPLE&EARTH ECOSYS	PS	252	252	208	N	Y
081	GEOG	5	PEOPLE&EARTH ECOSYS	PS	56	100	46	N	Y
08W	GEOG	88GE	SEMINAR SEQUENCE	PS	58	100	52	N	N
08W	HNRS	14	SCIENCE AND SOCIETY	LS	21	22	18	Y	N
08W	HNRS	20	NATURE-MODERN SCI	PS	36	40	17	N	N
08S	HNRS	64	ART AND AESTHETICS	LS	20	20	15	N	N
08W	HNRS	70A	GEN ENGR-MED&AG&LAW	LS	36	50	27	Y	Y
08S	LIFESCI	1	EVOLUTN&ECOL&BIODIV	LS	563	576	124	Y	Y
07F	LIFESCI	1	EVOLUTN&ECOL&BIODIV	LS	554	648	221	Y	Y
08W	LIFESCI	1	EVOLUTN&ECOL&BIODIV	LS	550	576	145	N	Y
081	LIFESCI	1	EVOLUTN&ECOL&BIODIV	LS	204	288	96	N	Y
07F	LIFESCI	15	LIFE-CONCPTS&ISSUES	LS	212	216	172	N	N
08S	LIFESCI	15	LIFE-CONCPTS&ISSUES	LS	146	216	114	N	N
08W	LIFESCI	15	LIFE-CONCPTS&ISSUES	LS	85	144	66	Y	N
07F	LING	1	INTR-STUDY-LANGUAGE	LS	398	398	280	N	N
08S	LING	1	INTR-STUDY-LANGUAGE	LS	366	366	241	Y	N
08W	LING	1	INTR-STUDY-LANGUAGE	LS	363	363	251	Y	N
081	LING	1	INTR-STUDY-LANGUAGE	LS	122	122	71	N	N
08S	MATH	98T	ELLIPTIC CURVES	PS	14	16	8	N	N
07F	MCD BIO	40	AIDS&SEXUAL TRANSMT	LS	124	150	101	N	N
08S	MIMG	6	INTRO MICROBIOLOGY	LS	84	100	44	Y	N
07F	NEUROSC	10	NEUROSCI-21ST CENT	LS	146	146	71	N	N
08S	PHILOS	8	INTRO-PHILOS OF SCI	PS	215	220	117	Y	N
081	PHY SCI	3	INTRO-HUMAN PHYSIOL	LS	120	144	57	N	Y
08W	PHY SCI	5	HMN PHYS-DIET&EXRCS	LS	457	457	359	N	Y
08S	PHY SCI	5	HMN PHYS-DIET&EXRCS	LS	450	450	324	N	Y
07F	PHY SCI	5	HMN PHYS-DIET&EXRCS	LS	442	443	363	Y	Y
081	PHY SCI	5	HMN PHYS-DIET&EXRCS	LS	67	90	55	N	Y
081	PHY SCI	13	INTRO-HUMAN ANATOMY	LS	56	60	18	N	Y
07F	PHYSICS	10	PHYSICS	PS	168	175	148	Y	N
08W	PHYSICS	10	PHYSICS	PS	124	188	101	Y	N
08S	PHYSICS	10	PHYSICS	PS	61	165	56	Y	N
081	PHYSICS	10	PHYSICS	PS	39	91	37	N	N
07F	PSYCH	15	INTRO PSYCHOBIOLOGY	LS	191	300	125	N	N
08W	PSYCH	15	INTRO PSYCHOBIOLOGY	LS	163	163	100	Y	N
081	PSYCH	15	INTRO PSYCHOBIOLOGY	LS	40	40	36	N	N
08S	SOC&GEN	M102W	DNA-PROMISE & PERIL	LS	76	76	29	Y	N
08S	STATS	10	INTRO-STAT REASON	PS	572	572	395	N	N
07F	STATS	10	INTRO-STAT REASON	PS	569	569	452	N	N
08W	STATS	10	INTRO-STAT REASON	PS	564	583	441	N	N
081	STATS	10	INTRO-STAT REASON	PS	227	254	169	N	N
08W	LIFESCI	2	CELLS&TISSUES&ORGNS	LS	535	540	136	Y	Y
07F	LIFESCI	2	CELLS&TISSUES&ORGNS	LS	495	504	116	Y	Y
08S	LIFESCI	2	CELLS&TISSUES&ORGNS	LS	461	468	87	Y	Y
081	LIFESCI	2	CELLS&TISSUES&ORGNS	LS	237	252	71	N	Y
07F	STATS	13	STATS-LIFE&HLTH SCI	LS	189	199	41	N	Y
08S	STATS	13	STATS-LIFE&HLTH SCI	LS	187	187	40	Y	Y
08W	STATS	13	STATS-LIFE&HLTH SCI	LS	177	177	39	N	Y
081	STATS	13	STATS-LIFE&HLTH SCI	LS	57	64	26	N	Y
08W	CHEM	14BL	GEN&ORGN CHEM LAB 1	PS	382	382	76	N	Y
08S	CHEM	14BL	GEN&ORGN CHEM LAB 1	PS	281	281	43	N	Y
07F	CHEM	14BL	GEN&ORGN CHEM LAB 1	PS	238	238	78	N	Y
081	CHEM	14BL	GEN&ORGN CHEM LAB 1	PS	154	160	36	N	Y
08W	CHEM	20L	GENRL CHEMISTRY LAB	PS	397	397	13	N	Y
08S	CHEM	20L	GENRL CHEMISTRY LAB	PS	204	204	7	N	Y
07F	CHEM	20L	GENRL CHEMISTRY LAB	PS	92	92	17	N	Y

Term	SubjArea	Catlg#	Course Title	Credit	Wk 3 Enroll	Real Cap	Non-BS	Ladder	Lab
081	CHEM	20L	GENRL CHEMISTRY LAB	PS	38	40	7	N	Y
08W	PHYSICS	1A	MECHANICS	PS	579	579	38	Y	Y
08S	PHYSICS	1A	MECHANICS	PS	184	184	16	Y	Y
07F	PHYSICS	1A	MECHANICS	PS	165	171	42	Y	Y
081	PHYSICS	1A	MECHANICS	PS	51	51	24	N	Y
07F	PHYSICS	1AH	MECHANICS-HONORS	PS	17	40	4	Y	Y
08S	PHYSICS	1B	OSCILTNS&WAVES&FLDS	PS	514	570	27	Y	Y
08W	PHYSICS	1B	OSCILTNS&WAVES&FLDS	PS	178	192	37	N	Y
07F	PHYSICS	1B	OSCILTNS&WAVES&FLDS	PS	119	171	10	Y	Y
081	PHYSICS	1B	OSCILTNS&WAVES&FLDS	PS	83	96	26	N	Y
08W	PHYSICS	1BH	OSCLTN&WAV&FLD-HNRS	PS	18	43	2	Y	Y
07F	PHYSICS	1C	ELECTRODYNMC&OPTICS	PS	244	244	16	Y	Y
08W	PHYSICS	1C	ELECTRODYNMC&OPTICS	PS	120	171	9	Y	Y
08S	PHYSICS	1C	ELECTRODYNMC&OPTICS	PS	81	171	8	Y	Y
081	PHYSICS	1C	ELECTRODYNMC&OPTICS	PS	53	65	11	Y	Y
08S	PHYSICS	1CH	ELECDYNM&OPTCS-HNRS	PS	13	35	0	Y	Y
07F	PHYSICS	6A	PHYSIC-LIFE SCI MAJ	PS	565	582	171	Y	Y
08W	PHYSICS	6A	PHYSIC-LIFE SCI MAJ	PS	389	389	109	N	Y
08S	PHYSICS	6A	PHYSIC-LIFE SCI MAJ	PS	380	386	93	Y	Y
081	PHYSICS	6A	PHYSIC-LIFE SCI MAJ	PS	225	260	93	N	Y
07F	PHYSICS	6AH	STATICS & DYNAMICS	PS	117	117	22	Y	Y
08W	PHYSICS	6B	PHYSIC-LIFE SCI MAJ	PS	499	545	82	Y	Y
07F	PHYSICS	6B	PHYSIC-LIFE SCI MAJ	PS	382	480	81	N	Y
08S	PHYSICS	6B	PHYSIC-LIFE SCI MAJ	PS	353	353	50	Y	Y
081	PHYSICS	6B	PHYSIC-LIFE SCI MAJ	PS	201	254	65	N	Y
08W	PHYSICS	6BH	SOUND&LIGHT&HYDRDYN	PS	102	112	16	Y	Y
08S	PHYSICS	6C	PHYSIC-LIFE SCI MAJ	PS	530	564	73	Y	Y
07F	PHYSICS	6C	PHYSIC-LIFE SCI MAJ	PS	349	386	54	N	Y
08W	PHYSICS	6C	PHYSIC-LIFE SCI MAJ	PS	272	340	38	Y	Y
081	PHYSICS	6C	PHYSIC-LIFE SCI MAJ	PS	208	265	38	N	Y
08S	PHYSICS	6CH	ELCTRC&MAGNT&TRNSPT	PS	98	117	4	Y	Y
07F	CHEM	14A	EQUILBR&ACIDS&BASES	PS	1108	1200	237	N	N
08W	CHEM	14A	EQUILBR&ACIDS&BASES	PS	454	530	167	N	N
081	CHEM	14A	EQUILBR&ACIDS&BASES	PS	101	125	63	N	N
08W	CHEM	14B	THRMDN&ELCTCHM&KNTC	PS	914	1050	156	N	N
08S	CHEM	14B	THRMDN&ELCTCHM&KNTC	PS	335	391	83	N	N
081	CHEM	14B	THRMDN&ELCTCHM&KNTC	PS	73	100	35	N	N
07F	CHEM	20A	CHEMICAL STRUCTURE	PS	991	991	76	Y	N
08W	CHEM	20A	CHEMICAL STRUCTURE	PS	222	235	37	Y	N
081	CHEM	20A	CHEMICAL STRUCTURE	PS	67	80	32	N	N
07F	CHEM	20AH	CHEM STRUCTURE-HNRS	PS	44	50	3	Y	N
08W	CHEM	20B	ENERGETICS&CHANGE	PS	752	752	51	Y	N
08S	CHEM	20B	ENERGETICS&CHANGE	PS	182	209	25	Y	N
081	CHEM	20B	ENERGETICS&CHANGE	PS	58	100	22	Y	N
08W	CHEM	20BH	ENRGTCS&CHANGE-HNRS	PS	39	50	3	N	N

Summary Data for 2007-2008

Total Enrollment in all FSI Courses	33978
Total Number of Courses	188
Total Number of PS courses	123
Total Number of LS courses	65
Total Number of Lab/Demo Courses	92
Total Number of courses taught by ladder faculty	90
Total Undergraduate Enrollment	25023

2008-2009 Academic Year

Term	SubjArea	Catlg#	Course Title	Credit	Wk 3 Enroll	Real Cap	Non-BS	Ladder	Lab
08F	A&O SCI	1	CLIMATE CHANGE	PS	194	196	162	N	N
09S	A&O SCI	1	CLIMATE CHANGE	PS	145	150	117	Y	N
09W	A&O SCI	1	CLIMATE CHANGE	PS	64	81	50	Y	N
091	A&O SCI	1	CLIMATE CHANGE	PS	44	44	37	N	N
09W	A&O SCI	2	AIR POLLUTION	PS	243	243	199	N	N
08F	A&O SCI	2	AIR POLLUTION	PS	193	203	163	Y	N
09S	A&O SCI	2	AIR POLLUTION	PS	158	158	125	Y	N
091	A&O SCI	2	AIR POLLUTION	PS	56	56	49	N	N
09W	A&O SCI	3	INTR-ATMOS ENVIRMNT	PS	161	162	127	N	N
09S	A&O SCI	3	INTR-ATMOS ENVIRMNT	PS	158	162	116	N	N
091	A&O SCI	3	INTR-ATMOS ENVIRMNT	PS	38	38	26	N	N
08F	A&O SCI	1L	CLIMATE CHANGE LAB	PS	58	150	49	N	Y
09S	A&O SCI	1L	CLIMATE CHANGE LAB	PS	52	100	42	Y	Y
091	A&O SCI	1L	CLIMATE CHANGE LAB	PS	25	25	21	N	Y
09W	A&O SCI	1L	CLIMATE CHANGE LAB	PS	21	100	17	Y	Y
09W	A&O SCI	2L	AIR POLLUTION LAB	PS	116	200	98	N	Y
08F	A&O SCI	2L	AIR POLLUTION LAB	PS	56	150	51	Y	Y
09S	A&O SCI	2L	AIR POLLUTION LAB	PS	54	100	41	Y	Y
091	A&O SCI	2L	AIR POLLUTION LAB	PS	24	24	23	N	Y
09W	A&O SCI	3L	INTR-ATMOS ENVR LAB	PS	85	125	66	N	Y
09S	A&O SCI	3L	INTR-ATMOS ENVR LAB	PS	64	150	54	N	Y
091	A&O SCI	3L	INTR-ATMOS ENVR LAB	PS	10	10	8	N	Y
09W	ANTHRO	7	HUMAN EVOLUTION	LS	359	359	250	Y	N
09S	ANTHRO	7	HUMAN EVOLUTION	LS	305	306	225	Y	N
091	ANTHRO	7	HUMAN EVOLUTION	LS	58	145	40	N	N
08F	ANTHRO	12	HMN EVLTN-COMP ANLY	LS	159	159	112	Y	N
09S	AP LING	98T	SOCIALITY&NEUROPATH	LS	19	20	12	N	N
08F	ASTR	3	NATURE OF UNIVERSE	PS	367	368	301	Y	Y
09S	ASTR	3	NATURE OF UNIVERSE	PS	332	360	251	Y	Y
09W	ASTR	3	NATURE OF UNIVERSE	PS	279	364	224	Y	Y
09S	ASTR	4	BLACK HOLES	PS	127	127	100	Y	N
08F	ASTR	4	BLACK HOLES	PS	81	81	64	Y	N
09W	ASTR	5	LIFE IN THE UNIVERS	PS	120	122	95	Y	N
08F	ASTR	5	LIFE IN THE UNIVERS	PS	86	86	61	Y	N
091	ASTR	5	LIFE IN THE UNIVERS	PS	75	190	53	N	N
09S	ASTR	6	CHANG CNCPT-UNIVERS	PS	71	117	56	Y	N
08F	CHEM	14A	EQUILBR&ACIDS&BASES	PS	1224	1224	253	N	N
09W	CHEM	14A	EQUILBR&ACIDS&BASES	PS	497	500	133	N	N
091	CHEM	14A	EQUILBR&ACIDS&BASES	PS	75	110	39	N	N
09W	CHEM	14B	THRMDN&ELCTCHM&KNTC	PS	986	986	139	N	N
09S	CHEM	14B	THRMDN&ELCTCHM&KNTC	PS	369	369	75	N	N
091	CHEM	14B	THRMDN&ELCTCHM&KNTC	PS	61	90	22	N	N
09W	CHEM	14BL	GEN&ORGN CHEM LAB 1	PS	421	421	49	N	Y
09S	CHEM	14BL	GEN&ORGN CHEM LAB 1	PS	280	280	28	N	Y
08F	CHEM	14BL	GEN&ORGN CHEM LAB 1	PS	163	163	27	N	Y
091	CHEM	14BL	GEN&ORGN CHEM LAB 1	PS	152	160	42	N	Y
08F	CHEM	20A	CHEMICAL STRUCTURE	PS	906	906	71	Y	N
09W	CHEM	20A	CHEMICAL STRUCTURE	PS	166	235	36	Y	N
091	CHEM	20A	CHEMICAL STRUCTURE	PS	44	90	22	Y	N
08F	CHEM	20AH	CHEM STRUCTURE-HNRS	PS	52	54	4	Y	N
09W	CHEM	20B	ENERGETICS&CHANGE	PS	665	820	28	Y	N
09S	CHEM	20B	ENERGETICS&CHANGE	PS	121	235	21	Y	N
091	CHEM	20B	ENERGETICS&CHANGE	PS	45	50	16	N	N
09W	CHEM	20BH	ENRGTCS&CHANGE-HNRS	PS	28	50	2	Y	N
09W	CHEM	20L	GENRL CHEMISTRY LAB	PS	390	390	12	N	Y
09S	CHEM	20L	GENRL CHEMISTRY LAB	PS	198	198	7	N	Y
08F	CHEM	20L	GENRL CHEMISTRY LAB	PS	117	117	4	N	Y
091	CHEM	20L	GENRL CHEMISTRY LAB	PS	37	37	3	N	Y
08F	E&S SCI	1	INTRO TO EARTH SCI	PS	85	92	65	Y	N
08F	E&S SCI	7	SPACE WEATHER	PS	97	117	78	N	N
09W	E&S SCI	8	EARTHQUAKES	PS	196	198	171	Y	Y
08F	E&S SCI	8	EARTHQUAKES	PS	184	184	159	N	Y

Term	SubjArea	Catlg#	Course Title	Credit	Wk 3 Enroll	Real Cap	Non-BS	Ladder	Lab
09S	E&S SCI	8	EARTHQUAKES	PS	165	198	132	Y	Y
091	E&S SCI	8	EARTHQUAKES	PS	10	60	9	N	Y
08F	E&S SCI	9	SOLAR SYSTM&PLANETS	PS	120	120	102	Y	N
09S	E&S SCI	9	SOLAR SYSTM&PLANETS	PS	96	120	72	Y	N
09W	E&S SCI	9	SOLAR SYSTM&PLANETS	PS	70	75	54	Y	N
091	E&S SCI	9	SOLAR SYSTM&PLANETS	PS	13	60	12	N	N
09W	E&S SCI	15	INTROD-OCEANOGRAPHY	PS	418	418	331	Y	Y
08F	E&S SCI	15	INTROD-OCEANOGRAPHY	PS	388	388	266	Y	Y
09W	E&S SCI	16	MJR EVNTS-HIST LIFE	LS	86	92	62	Y	N
09S	E&S SCI	20	NAT HST-SOUTHRN CAL	PS	7	20	4	N	Y
08F	E&S SCI	1F	EARTH SCI-FIELDWORK	PS	23	44	18	Y	Y
09W	EE BIOL	17	EVOLTN FOR EVERYONE	LS	47	80	34	Y	N
09S	EE BIOL	98T	SCI&ANML BHVR-MEDIA	LS	11	11	11	N	N
08F	GE CLST	70A	COSMOS AND LIFE	PS	215	215	166	Y	Y
09W	GE CLST	70B	COSMOS AND LIFE	LS	172	200	139	Y	Y
09S	GE CLST	70CW	COSMOS AND LIFE	LS	102	130	88	N	N
09S	GE CLST	70DW	COSMOS AND LIFE	PS	59	66	42	N	N
08F	GE CLST	80A	FRONTRS-HUMAN AGING	LS	176	176	76	N	N
08F	GE CLST	M1A	GLOBAL ENVIRONMNT 1	PS	176	176	136	Y	Y
09W	GE CLST	M1B	GLOBAL ENVIRONMNT 2	LS	153	176	122	Y	Y
08F	GEOG	1	EARTH PHYS ENVIRONM	PS	88	100	73	Y	Y
09W	GEOG	1	EARTH PHYS ENVIRONM	PS	56	100	48	Y	Y
08F	GEOG	2	BIODIVR-CHNGNG WRLD	LS	156	162	134	N	Y
09W	GEOG	2	BIODIVR-CHNGNG WRLD	LS	61	100	47	Y	Y
091	GEOG	2	BIODIVR-CHNGNG WRLD	LS	37	100	30	N	Y
08F	GEOG	5	PEOPLE&EARTH ECOSYS	PS	288	288	258	Y	Y
09S	GEOG	5	PEOPLE&EARTH ECOSYS	PS	274	274	228	N	Y
09W	GEOG	5	PEOPLE&EARTH ECOSYS	PS	274	274	237	N	Y
091	GEOG	5	PEOPLE&EARTH ECOSYS	PS	128	200	110	N	Y
09W	GEOG	88GE	SEMINAR SEQUENCE	PS	48	100	42	N	N
09W	HNRS	14	SCIENCE AND SOCIETY	LS	20	21	12	Y	N
09S	HNRS	20	NATURE-MODERN SCI	PS	40	40	17	N	N
09S	HNRS	64	ART AND AESTHETICS	LS	26	26	11	N	N
09W	HNRS	70A	GEN ENGR-MED&AG&LAW	LS	30	44	16	Y	Y
08F	HUM CS	10A	COMPLEX SYSTEMS SCI	PS	40	45	12	N	N
09W	HUM CS	10A	COMPLEX SYSTEMS SCI	PS	35	38	11	N	N
09S	LIFESCI	1	EVOLUTN&ECOL&BIODIV	LS	588	600	156	Y	Y
08F	LIFESCI	1	EVOLUTN&ECOL&BIODIV	LS	542	576	122	Y	Y
09W	LIFESCI	1	EVOLUTN&ECOL&BIODIV	LS	532	576	108	N	Y
091	LIFESCI	1	EVOLUTN&ECOL&BIODIV	LS	237	288	108	N	Y
08F	LIFESCI	2	CELLS&TISSUES&ORGNS	LS	596	612	72	Y	Y
09W	LIFESCI	2	CELLS&TISSUES&ORGNS	LS	554	554	70	Y	Y
09S	LIFESCI	2	CELLS&TISSUES&ORGNS	LS	528	540	69	Y	Y
091	LIFESCI	2	CELLS&TISSUES&ORGNS	LS	260	288	85	N	Y
08F	LIFESCI	15	LIFE-CONCPTS&ISSUES	LS	214	216	177	N	N
09W	LIFESCI	15	LIFE-CONCPTS&ISSUES	LS	72	120	52	Y	N
08F	LING	1	INTR-STUDY-LANGUAGE	LS	371	371	208	Y	N
09W	LING	1	INTR-STUDY-LANGUAGE	LS	358	360	207	Y	N
09S	LING	1	INTR-STUDY-LANGUAGE	LS	334	334	190	Y	N
091	LING	1	INTR-STUDY-LANGUAGE	LS	103	103	43	N	N
08F	MCD BIO	40	AIDS&SEXUAL TRANSMT	LS	144	150	119	N	N
09S	MCD BIO	40	AIDS&SEXUAL TRANSMT	LS	112	115	83	N	N
09W	MCD BIO	40	AIDS&SEXUAL TRANSMT	LS	94	150	76	N	N
09S	MCD BIO	50	STEM CELL BIO&PLTCS	LS	103	108	37	N	N
08F	MCD BIO	50	STEM CELL BIO&PLTCS	LS	100	100	23	N	N
09W	MCD BIO	50	STEM CELL BIO&PLTCS	LS	91	91	26	N	N
091	MCD BIO	50	STEM CELL BIO&PLTCS	LS	66	80	59	N	N
09W	MIMG	6	INTRO MICROBIOLOGY	LS	96	100	35	Y	N
091	MIMG	6	MICROBIO FOR NONMJR	LS	33	50	25	Y	N
09W	NEUROSC	10	NEUROSCI-21ST CENT	LS	58	130	24	N	N
09S	PHILOS	8	INTRO-PHILOS OF SCI	PS	318	318	199	Y	N
091	PHY SCI	3	INTRO-HUMAN PHYSIOL	LS	131	144	49	N	Y
09S	PHY SCI	5	HMN PHYS-DIET&EXRCS	LS	450	450	334	N	Y
09W	PHY SCI	5	HMN PHYS-DIET&EXRCS	LS	448	451	342	N	Y
08F	PHY SCI	5	HMN PHYS-DIET&EXRCS	LS	443	446	345	Y	Y
091	PHY SCI	5	HMN PHYS-DIET&EXRCS	LS	54	90	43	N	Y

Term	SubjArea	Catlg#	Course Title	Credit	Wk 3 Enroll	Real Cap	Non-BS	Ladder	Lab
091	PHY SCI	13	INTRO-HUMAN ANATOMY	LS	53	60	12	N	Y
08F	PHYSICS	10	PHYSICS	PS	133	135	111	Y	N
09W	PHYSICS	10	PHYSICS	PS	120	120	102	Y	N
091	PHYSICS	10	PHYSICS	PS	63	91	58	N	N
09W	PHYSICS	1A	MECHANICS	PS	561	563	30	Y	Y
08F	PHYSICS	1A	MECHANICS	PS	192	193	34	Y	Y
09S	PHYSICS	1A	MECHANICS	PS	170	172	25	Y	Y
091	PHYSICS	1A	MECHANICS	PS	41	48	22	Y	Y
09S	PHYSICS	1B	OSCILTNS&WAVES&FLDS	PS	503	579	24	Y	Y
09W	PHYSICS	1B	OSCILTNS&WAVES&FLDS	PS	205	205	11	Y	Y
08F	PHYSICS	1B	OSCILTNS&WAVES&FLDS	PS	180	180	9	Y	Y
091	PHYSICS	1B	OSCILTNS&WAVES&FLDS	PS	88	96	40	N	Y
08F	PHYSICS	1C	ELECTRODYNMC&OPTICS	PS	255	255	13	Y	Y
09S	PHYSICS	1C	ELECTRODYNMC&OPTICS	PS	163	171	10	Y	Y
09W	PHYSICS	1C	ELECTRODYNMC&OPTICS	PS	155	171	9	Y	Y
091	PHYSICS	1C	ELECTRODYNMC&OPTICS	PS	64	95	13	Y	Y
08F	PHYSICS	6A	PHYSIC-LIFE SCI MAJ	PS	570	574	86	Y	Y
09S	PHYSICS	6A	PHYSIC-LIFE SCI MAJ	PS	392	392	71	Y	Y
09W	PHYSICS	6A	PHYSIC-LIFE SCI MAJ	PS	372	386	49	Y	Y
091	PHYSICS	6A	PHYSIC-LIFE SCI MAJ	PS	243	284	95	N	Y
09W	PHYSICS	6B	PHYSIC-LIFE SCI MAJ	PS	544	544	56	Y	Y
09S	PHYSICS	6B	PHYSIC-LIFE SCI MAJ	PS	361	361	33	Y	Y
08F	PHYSICS	6B	PHYSIC-LIFE SCI MAJ	PS	297	364	43	Y	Y
091	PHYSICS	6B	PHYSIC-LIFE SCI MAJ	PS	220	294	62	N	Y
09S	PHYSICS	6C	PHYSIC-LIFE SCI MAJ	PS	469	570	74	Y	Y
09W	PHYSICS	6C	PHYSIC-LIFE SCI MAJ	PS	307	342	35	Y	Y
08F	PHYSICS	6C	PHYSIC-LIFE SCI MAJ	PS	266	386	33	N	Y
091	PHYSICS	6C	PHYSIC-LIFE SCI MAJ	PS	206	308	37	N	Y
09W	PSYCH	15	INTRO PSYCHOBIOLOGY	LS	137	137	84	Y	N
091	PSYCH	15	INTRO PSYCHOBIOLOGY	LS	58	58	53	N	N
09S	PSYCH	98TB	MED&MIND VS W PSYCH	LS	15	15	14	N	N
09W	SOC GEN	101	GNTC CNCPT-HUMN SCI	LS	27	40	17	N	N
09S	SOC GEN	M102W	DNA-PROMISE & PERIL	LS	122	122	33	Y	N
09W	STATS	10	INTRO-STAT REASON	PS	546	546	401	N	N
09S	STATS	10	INTRO-STAT REASON	PS	496	496	341	N	N
08F	STATS	10	INTRO-STAT REASON	PS	443	443	319	N	N
091	STATS	10	INTRO-STAT REASON	PS	246	246	185	N	N
09W	STATS	13	STATS-LIFE&HLTH SCI	LS	205	205	38	Y	Y
09S	STATS	13	STATS-LIFE&HLTH SCI	LS	201	201	37	N	Y
08F	STATS	13	STATS-LIFE&HLTH SCI	LS	188	188	35	Y	Y
091	STATS	13	STATS-LIFE&HLTH SCI	LS	56	56	21	N	Y
09S	STATS	98T	RATNL THOUGHT PRCSS	PS	12	12	9	N	Y

Summary Data for 2008-2009

Total Enrollment in all FSI Courses	34099
Total Number of Courses	185
Total Number of PS courses	113
Total Number of LS courses	72
Total Number of Lab/Demo Courses	87
Total Number of courses taught by ladder faculty	85
Total Undergraduate Enrollment	25655

2009-2010 Academic Year

Term	SubjArea	Catlg#	Course Title	Credit	Wk 3 Enroll	Real Cap	Non-BS	Ladder	Lab
10S	A&O SCI	1	CLIMATE CHANGE	PS	179	179	148	N	N
09F	A&O SCI	1	CLIMATE CHANGE	PS	159	162	124	Y	N
10W	A&O SCI	1	CLIMATE CHANGE	PS	82	82	64	Y	N
101	A&O SCI	1	CLIMATE CHANGE	PS	0	90	0	N	N
09F	A&O SCI	2	AIR POLLUTION	PS	242	243	211	Y	N
10W	A&O SCI	2	AIR POLLUTION	PS	153	239	121	Y	N
10S	A&O SCI	2	AIR POLLUTION	PS	141	162	113	Y	N
101	A&O SCI	2	AIR POLLUTION	PS	22	90	19	N	N
10S	A&O SCI	3	INTR-ATMOS ENVIRMNT	PS	162	162	124	N	N
09F	A&O SCI	3	INTR-ATMOS ENVIRMNT	PS	157	162	119	N	N
10W	A&O SCI	3	INTR-ATMOS ENVIRMNT	PS	69	81	47	Y	N
101	A&O SCI	3	INTR-ATMOS ENVIRMNT	PS	16	90	14	N	N
10S	A&O SCI	1L	CLIMATE CHANGE LAB	PS	61	100	51	N	Y
10W	A&O SCI	1L	CLIMATE CHANGE LAB	PS	47	81	38	Y	Y
09F	A&O SCI	1L	CLIMATE CHANGE LAB	PS	47	100	40	Y	Y
101	A&O SCI	1L	CLIMATE CHANGE LAB	PS	0	0	0	N	Y
09F	A&O SCI	2L	AIR POLLUTION LAB	PS	92	200	78	Y	Y
10S	A&O SCI	2L	AIR POLLUTION LAB	PS	72	100	59	Y	Y
10W	A&O SCI	2L	AIR POLLUTION LAB	PS	68	200	56	Y	Y
101	A&O SCI	2L	AIR POLLUTION LAB	PS	14	14	11	N	Y
10S	A&O SCI	3L	INTR-ATMOS ENVR LAB	PS	86	100	71	N	Y
09F	A&O SCI	3L	INTR-ATMOS ENVR LAB	PS	80	100	62	N	Y
10W	A&O SCI	3L	INTR-ATMOS ENVR LAB	PS	35	150	26	Y	Y
101	A&O SCI	3L	INTR-ATMOS ENVR LAB	PS	8	8	7	N	Y
10W	ANTHRO	7	HUMAN EVOLUTION	LS	356	360	230	Y	N
101	ANTHRO	7	HUMAN EVOLUTION	LS	0	145	0	N	N
10S	ASTR	3	NATURE OF UNIVERSE	PS	356	362	236	Y	Y
09F	ASTR	3	NATURE OF UNIVERSE	PS	350	368	292	Y	Y
10W	ASTR	3	NATURE OF UNIVERSE	PS	256	330	193	Y	Y
09F	ASTR	4	BLACK HOLES	PS	121	122	100	Y	N
10S	ASTR	4	BLACK HOLES	PS	116	117	77	N	N
10W	ASTR	5	LIFE IN THE UNIVERS	PS	123	132	79	Y	N
09F	ASTR	5	LIFE IN THE UNIVERS	PS	112	117	62	Y	N
101	ASTR	5	LIFE IN THE UNIVERS	PS	59	190	34	N	N
10S	ASTR	6	CHANG CNCPT-UNIVERS	PS	47	117	34	Y	N
09F	E&S SCI	1	INTRO TO EARTH SCI	PS	94	105	61	Y	N
09F	E&S SCI	3	ASTROBIOLOGY	PS	91	91	43	Y	N
10W	E&S SCI	7	SPACE WEATHER	PS	56	80	43	N	N
10S	E&S SCI	7	SPACE WEATHER	PS	46	80	36	N	N
10S	E&S SCI	8	EARTHQUAKES	PS	208	208	170	Y	Y
10W	E&S SCI	8	EARTHQUAKES	PS	203	225	173	Y	Y
09F	E&S SCI	8	EARTHQUAKES	PS	190	190	166	Y	Y
101	E&S SCI	8	EARTHQUAKES	PS	16	60	16	N	Y
09F	E&S SCI	9	SOLAR SYSTM&PLANETS	PS	120	120	101	Y	N
10S	E&S SCI	9	SOLAR SYSTM&PLANETS	PS	61	75	46	Y	N
10W	E&S SCI	9	SOLAR SYSTM&PLANETS	PS	44	50	33	Y	N
09F	E&S SCI	10	EXPLORING MARS	PS	71	75	62	Y	N
10S	E&S SCI	13	NATURAL DISASTERS	PS	37	37	31	Y	N
10S	E&S SCI	15	INTROD-OCEANOGRAPHY	PS	342	342	242	Y	Y
09F	E&S SCI	15	INTROD-OCEANOGRAPHY	PS	316	316	214	Y	Y
10W	E&S SCI	16	MJR EVNTS-HIST LIFE	LS	92	92	63	Y	N
10S	E&S SCI	20	NAT HST-SOUTHRN CAL	PS	12	20	9	N	Y
09F	E&S SCI	1F	EARTH SCI-FIELDWORK	PS	41	45	36	Y	Y
10S	E&S SCI	98T	OWENS VALLEY	PS	7	12	4	N	N
10W	EE BIOL	17	EVOLTN FOR EVERYONE	LS	42	80	27	Y	N
101	ENVIRON	12	SUSTNBLTY&ENVIRNMNT	PS	51	1059	42	Y	N
09F	GE CLST	70A	COSMOS AND LIFE	PS	200	200	163	Y	Y
10W	GE CLST	70B	COSMOS AND LIFE	LS	165	200	145	Y	Y
10S	GE CLST	70CW	COSMOS AND LIFE	LS	99	100	84	N	N
10S	GE CLST	70DW	COSMOS AND LIFE	PS	63	63	59	N	N
09F	GE CLST	72A	SEX-BIOLOGY-SOCIETY	LS	197	200	114	Y	N
09F	GE CLST	80A	FRONTRS-HUMAN AGING	LS	162	162	74	N	N

Term	SubjArea	Catlg#	Course Title	Credit	Wk 3 Enroll	Real Cap	Non-BS	Ladder	Lab
09F	GE CLST	M1A	GLOBAL ENVIRONMNT 1	PS	153	160	116	Y	Y
10W	GE CLST	M1B	GLOBAL ENVIRONMNT 2	LS	121	176	97	Y	Y
09F	GEOG	1	EARTH PHYS ENVIRONM	PS	105	105	84	Y	Y
10W	GEOG	2	BIODIVR-CHNGNG WRLD	LS	180	180	156	N	Y
101	GEOG	2	BIODIVR-CHNGNG WRLD	LS	69	100	60	N	Y
10W	GEOG	5	PEOPLE&EARTH ECOSYS	PS	300	300	257	N	Y
09F	GEOG	5	PEOPLE&EARTH ECOSYS	PS	289	289	236	Y	Y
10S	GEOG	5	PEOPLE&EARTH ECOSYS	PS	254	254	220	Y	Y
101	GEOG	5	PEOPLE&EARTH ECOSYS	PS	98	150	83	N	Y
09F	GEOG	7	GEOG INFO SYSTEMS	PS	117	120	74	Y	Y
10S	GEOG	7	GEOG INFO SYSTEMS	PS	100	100	76	Y	Y
101	GEOG	7	GEOG INFO SYSTEMS	PS	32	45	28	N	Y
10W	HNRS	14	SCIENCE AND SOCIETY	LS	18	18	14	Y	N
10W	HNRS	20	NATURE-MODERN SCI	PS	23	25	11	N	N
10S	HNRS	64	ART AND AESTHETICS	LS	25	25	17	N	N
10W	HNRS	70A	GEN ENGR-MED&AG&LAW	LS	25	44	20	Y	Y
09F	HUM CS	10A	COMPLEX SYSTEMS SCI	PS	43	43	14	N	N
101	HUM CS	M10A	COMPLEX SYSTEMS SCI	PS	1	5	0	N	N
10S	LIFESCI	1	EVOLUTN&ECOL&BIODIV	LS	501	504	110	N	Y
10W	LIFESCI	1	EVOLUTN&ECOL&BIODIV	LS	487	504	126	N	Y
09F	LIFESCI	1	EVOLUTN&ECOL&BIODIV	LS	449	504	148	N	Y
101	LIFESCI	1	EVOLUTN&ECOL&BIODIV	LS	194	216	66	N	Y
09F	LIFESCI	15	LIFE-CONCPTS&ISSUES	LS	214	216	167	N	N
10W	LIFESCI	15	LIFE-CONCPTS&ISSUES	LS	143	144	114	Y	N
10S	LING	1	INTR-STUDY-LANGUAGE	LS	379	379	246	N	N
10W	LING	1	INTR-STUDY-LANGUAGE	LS	368	368	236	Y	N
09F	LING	1	INTR-STUDY-LANGUAGE	LS	305	305	177	Y	N
101	LING	1	INTR-STUDY-LANGUAGE	LS	77	77	42	N	N
09F	MCD BIO	40	AIDS&SEXUAL TRANSMT	LS	148	150	122	N	N
10S	MCD BIO	40	AIDS&SEXUAL TRANSMT	LS	67	150	36	N	N
10W	MCD BIO	40	AIDS&SEXUAL TRANSMT	LS	49	70	37	N	N
10W	MCD BIO	50	STEM CELL BIO&PLTCS	LS	96	96	26	N	N
09F	MCD BIO	50	STEM CELL BIO&PLTCS	LS	94	96	39	N	N
10S	MCD BIO	50	STEM CELL BIO&PLTCS	LS	93	96	27	N	N
101	MCD BIO	50	STEM CELL BIO&PLTCS	LS	26	60	26	N	N
10W	MIMG	6	MICROBIO FOR NONMJR	LS	126	126	83	Y	N
101	MIMG	6	MICROBIO FOR NONMJR	LS	44	70	28	Y	N
09F	NEUROSC	10	NEUROSCI-21ST CENT	LS	171	171	79	N	N
10S	PHILOS	8	INTRO-PHILOS OF SCI	PS	328	328	169	Y	N
101	PHY SCI	3	INTRO-HUMAN PHYSIOL	LS	136	144	58	N	Y
10S	PHY SCI	5	HMN PHYS-DIET&EXRCS	LS	499	499	385	N	Y
10W	PHY SCI	5	HMN PHYS-DIET&EXRCS	LS	459	469	371	N	Y
09F	PHY SCI	5	HMN PHYS-DIET&EXRCS	LS	457	457	354	Y	Y
101	PHY SCI	13	INTRO-HUMAN ANATOMY	LS	51	60	17	Y	Y
09F	PHYSICS	10	PHYSICS	PS	144	150	123	Y	N
10W	PHYSICS	10	PHYSICS	PS	133	135	117	Y	N
101	PHYSICS	10	PHYSICS	PS	50	91	49	N	N
10W	PSYCH	15	INTRO PSYCHOBIOLOGY	LS	190	190	91	Y	N
101	PSYCH	15	INTRO PSYCHOBIOLOGY	LS	41	41	39	N	N
10W	PSYCH	98TB	WHY WE REMEMBER	LS	14	15	13	N	N
10W	SOC GEN	101	GNTC CNCPT-HUMN SCI	LS	34	38	20	N	N
10S	SOC GEN	102W	DNA-PROMISE & PERIL	LS	117	117	25	Y	N
10S	STATS	10	INTRO-STAT REASON	PS	499	499	363	N	N
10W	STATS	10	INTRO-STAT REASON	PS	460	460	354	N	N
09F	STATS	10	INTRO-STAT REASON	PS	439	439	313	N	N
101	STATS	10	INTRO-STAT REASON	PS	312	312	254	N	N
10S	STATS	98T	DOCTRS SMOKE CAMELS	PS	13	13	7	N	N
09F	LIFESCI	2	CELLS&TISSUES&ORGNS	LS	637	640	67	Y	Y
10S	LIFESCI	2	CELLS&TISSUES&ORGNS	LS	598	600	71	Y	Y
10W	LIFESCI	2	CELLS&TISSUES&ORGNS	LS	572	577	69	Y	Y
101	LIFESCI	2	CELLS&TISSUES&ORGNS	LS	213	216	72	N	Y
10S	STATS	13	STATS-LIFE&HLTH SCI	LS	175	175	28	N	Y
09F	STATS	13	STATS-LIFE&HLTH SCI	LS	159	159	20	N	Y
10W	STATS	13	STATS-LIFE&HLTH SCI	LS	156	156	16	N	Y
101	STATS	13	STATS-LIFE&HLTH SCI	LS	53	53	16	N	Y
10W	CHEM	14BL	GEN&ORGN CHEM LAB 1	PS	346	346	39	N	Y

Term	SubjArea	Catlg#	Course Title	Credit	Wk 3 Enroll	Real Cap	Non-BS	Ladder	Lab
101	CHEM	14BL	GEN&ORGN CHEM LAB 1	PS	273	273	86	N	Y
10S	CHEM	14BL	GEN&ORGN CHEM LAB 1	PS	237	237	33	N	Y
09F	CHEM	14BL	GEN&ORGN CHEM LAB 1	PS	209	209	24	N	Y
10W	CHEM	20L	GENRL CHEMISTRY LAB	PS	381	381	13	N	Y
10S	CHEM	20L	GENRL CHEMISTRY LAB	PS	201	201	7	N	Y
09F	CHEM	20L	GENRL CHEMISTRY LAB	PS	98	98	11	N	Y
10W	PHYSICS	1A	MECHANICS	PS	601	604	31	Y	Y
10S	PHYSICS	1A	MECHANICS	PS	186	188	32	Y	Y
09F	PHYSICS	1A	MECHANICS	PS	185	200	37	Y	Y
101	PHYSICS	1A	MECHANICS	PS	82	96	50	Y	Y
10S	PHYSICS	1B	OSCILTNS&WAVES&FLDS	PS	539	600	42	Y	Y
09F	PHYSICS	1B	OSCILTNS&WAVES&FLDS	PS	179	180	16	Y	Y
10W	PHYSICS	1B	OSCILTNS&WAVES&FLDS	PS	176	200	25	Y	Y
101	PHYSICS	1B	OSCILTNS&WAVES&FLDS	PS	96	145	36	N	Y
09F	PHYSICS	1C	ELECTRODYNMC&OPTICS	PS	258	261	9	Y	Y
10W	PHYSICS	1C	ELECTRODYNMC&OPTICS	PS	132	180	16	N	Y
10S	PHYSICS	1C	ELECTRODYNMC&OPTICS	PS	127	172	8	N	Y
101	PHYSICS	1C	ELECTRODYNMC&OPTICS	PS	0	95	0	Y	Y
09F	PHYSICS	6A	PHYSIC-LIFE SCI MAJ	PS	568	570	88	Y	Y
10W	PHYSICS	6A	PHYSIC-LIFE SCI MAJ	PS	392	392	74	Y	Y
10S	PHYSICS	6A	PHYSIC-LIFE SCI MAJ	PS	390	390	62	Y	Y
101	PHYSICS	6A	PHYSIC-LIFE SCI MAJ	PS	265	296	88	N	Y
10W	PHYSICS	6B	PHYSIC-LIFE SCI MAJ	PS	545	574	55	Y	Y
10S	PHYSICS	6B	PHYSIC-LIFE SCI MAJ	PS	372	376	43	Y	Y
09F	PHYSICS	6B	PHYSIC-LIFE SCI MAJ	PS	349	360	36	Y	Y
101	PHYSICS	6B	PHYSIC-LIFE SCI MAJ	PS	252	330	77	N	Y
10S	PHYSICS	6C	PHYSIC-LIFE SCI MAJ	PS	566	570	54	Y	Y
10W	PHYSICS	6C	PHYSIC-LIFE SCI MAJ	PS	360	360	28	Y	Y
09F	PHYSICS	6C	PHYSIC-LIFE SCI MAJ	PS	297	360	38	Y	Y
101	PHYSICS	6C	PHYSIC-LIFE SCI MAJ	PS	205	308	41	N	Y
09F	CHEM	14A	EQUILBR&ACIDS&BASES	PS	1159	1167	223	N	N
10W	CHEM	14A	EQUILBR&ACIDS&BASES	PS	532	532	148	N	N
101	CHEM	14A	EQUILBR&ACIDS&BASES	PS	193	1149	147	N	N
10W	CHEM	14B	THRMDN&ELCTCHM&KNTC	PS	931	1050	133	N	N
10S	CHEM	14B	THRMDN&ELCTCHM&KNTC	PS	494	494	97	N	N
101	CHEM	14B	THRMDN&ELCTCHM&KNTC	PS	0	100	0	N	N
09F	CHEM	20A	CHEMICAL STRUCTURE	PS	936	936	92	Y	N
10W	CHEM	20A	CHEMICAL STRUCTURE	PS	217	235	38	Y	N
101	CHEM	20A	CHEMICAL STRUCTURE	PS	56	100	17	Y	N
09F	CHEM	20AH	CHEM STRUCTURE-HNRS	PS	39	50	4	Y	N
10W	CHEM	20B	ENERGETICS&CHANGE	PS	632	714	44	Y	N
10S	CHEM	20B	ENERGETICS&CHANGE	PS	181	235	22	N	N
101	CHEM	20B	ENERGETICS&CHANGE	PS	0	100	0	Y	N

Summary Data for 2009-2010

Total Enrollment in all FSI Courses	34074
Total Number of Courses	190
Total Number of PS courses	119
Total Number of LS courses	71
Total Number of Lab/Demo Courses	86
Total Number of courses taught by ladder faculty	87
Total Undergraduate Enrollment	25611

2010-2011 Academic Year

Term	SubjArea	Catlg#	Course Title	Credit	Wk 3 Enroll	Real Cap	Non-BS	Ladder	Lab
10F	A&O SCI	1	CLIMATE CHANGE	PS	175	175	145	N	N
11W	A&O SCI	1	CLIMATE CHANGE	PS	126	135	105	Y	N
11S	A&O SCI	1	CLIMATE CHANGE	PS	78	180	59	Y	N
111	A&O SCI	1	CLIMATE CHANGE	PS	10	10	9	N	N
11S	A&O SCI	2	AIR POLLUTION	PS	180	180	132	N	N
10F	A&O SCI	2	AIR POLLUTION	PS	167	167	133	Y	N
11W	A&O SCI	2	AIR POLLUTION	PS	105	162	75	Y	N
111	A&O SCI	2	AIR POLLUTION	PS	22	90	16	N	N
10F	A&O SCI	3	INTR-ATMOS ENVIRMNT	PS	179	180	142	N	N
11W	A&O SCI	3	INTR-ATMOS ENVIRMNT	PS	173	180	121	N	N
11S	A&O SCI	3	INTR-ATMOS ENVIRMNT	PS	160	180	121	Y	N
10F	A&O SCI	1L	CLIMATE CHANGE LAB	PS	67	100	59	N	Y
11W	A&O SCI	1L	CLIMATE CHANGE LAB	PS	51	100	45	Y	Y
11S	A&O SCI	1L	CLIMATE CHANGE LAB	PS	30	100	19	Y	Y
111	A&O SCI	1L	CLIMATE CHANGE LAB	PS	2	2	1	N	Y
11S	A&O SCI	2L	AIR POLLUTION LAB	PS	64	100	50	N	Y
11W	A&O SCI	2L	AIR POLLUTION LAB	PS	45	100	31	Y	Y
10F	A&O SCI	2L	AIR POLLUTION LAB	PS	42	200	38	Y	Y
111	A&O SCI	2L	AIR POLLUTION LAB	PS	5	5	4	N	Y
11S	A&O SCI	3L	INTR-ATMOS ENVR LAB	PS	72	100	53	Y	Y
11W	A&O SCI	3L	INTR-ATMOS ENVR LAB	PS	71	100	49	N	Y
10F	A&O SCI	3L	INTR-ATMOS ENVR LAB	PS	61	100	49	N	Y
11W	ANTHRO	7	HUMAN EVOLUTION	LS	323	360	201	Y	N
11S	ANTHRO	7	HUMAN EVOLUTION	LS	311	311	216	Y	N
111	ANTHRO	7	HUMAN EVOLUTION	LS	49	145	35	N	N
11S	ASTR	3	NATURE OF UNIVERSE	PS	365	384	224	Y	Y
10F	ASTR	3	NATURE OF UNIVERSE	PS	319	360	247	Y	Y
11W	ASTR	3	NATURE OF UNIVERSE	PS	313	342	241	Y	Y
10F	ASTR	4	BLACK HOLES	PS	123	123	90	Y	N
11S	ASTR	4	BLACK HOLES	PS	58	90	33	Y	N
11W	ASTR	5	LIFE IN THE UNIVERS	PS	131	134	89	Y	N
10F	ASTR	5	LIFE IN THE UNIVERS	PS	118	120	72	Y	N
11S	ASTR	5	LIFE IN THE UNIVERS	PS	112	118	63	Y	N
111	ASTR	5	LIFE IN THE UNIVERS	PS	82	190	54	N	N
11W	DIS STD	M98T	DVLPMT DISABILITIES	LS	10	10	8	N	N
10F	E&S SCI	1	INTRO TO EARTH SCI	PS	103	105	68	Y	N
11W	E&S SCI	1	INTRO TO EARTH SCI	PS	31	60	13	Y	N
10F	E&S SCI	3	ASTROBIOLOGY	PS	88	90	42	Y	N
11W	E&S SCI	5	ENVIRON GEOLOGY-L A	PS	30	60	24	Y	N
111	E&S SCI	5	ENVIRON GEOLOGY-L A	PS	11	20	11	N	N
10F	E&S SCI	7	SPACE WEATHER	PS	75	80	57	N	N
10F	E&S SCI	8	EARTHQUAKES	PS	182	182	156	Y	Y
11S	E&S SCI	8	EARTHQUAKES	PS	172	207	139	Y	Y
11W	E&S SCI	8	EARTHQUAKES	PS	151	180	128	Y	Y
10F	E&S SCI	9	SOLAR SYSTM&PLANETS	PS	61	61	47	Y	N
11W	E&S SCI	9	SOLAR SYSTM&PLANETS	PS	57	60	50	Y	N
11S	E&S SCI	9	SOLAR SYSTM&PLANETS	PS	55	75	37	Y	N
111	E&S SCI	9	SOLAR SYSTM&PLANETS	PS	10	20	9	N	N
11W	E&S SCI	10	EXPLORING MARS	PS	70	75	58	Y	N
11S	E&S SCI	13	NATURAL DISASTERS	PS	41	75	31	Y	N
10F	E&S SCI	15	INTROD-OCEANOGRAPHY	PS	396	396	292	Y	Y
11S	E&S SCI	15	INTROD-OCEANOGRAPHY	PS	305	375	199	Y	Y
11W	E&S SCI	16	MJR EVNTS-HIST LIFE	LS	94	94	70	Y	N
11S	E&S SCI	20	NAT HST-SOUTHRN CAL	PS	10	20	9	N	Y
10F	E&S SCI	1F	EARTH SCI-FIELDWORK	PS	47	47	36	Y	Y
11W	E&S SCI	1F	EARTH SCI-FIELDWORK	PS	4	20	3	Y	Y
11W	E&S SCI	98T	EARTH WITHOUT MOON	PS	16	16	13	N	N
11S	EE BIOL	98T	CRNT DEBATS-EVOLUTN	LS	20	20	18	N	N
111	ENVIRON	12	SUSTNBLTY&ENVIRNMNT	PS	29	60	19	Y	N
10F	GE CLST	70A	COSMOS AND LIFE	PS	209	209	172	Y	Y
11W	GE CLST	70B	COSMOS AND LIFE	LS	171	200	150	Y	Y
11S	GE CLST	70CW	COSMOS AND LIFE	PS	157	160	139	Y	N

Term	SubjArea	Catlg#	Course Title	Credit	Wk 3 Enroll	Real Cap	Non-BS	Ladder	Lab
10F	GE CLST	72A	SEX-BIOLOGY-SOCIETY	LS	203	203	135	Y	N
11W	GE CLST	72B	SEX-BIOLOGY-SOCIETY	LS	164	200	114	Y	N
10F	GE CLST	80A	FRONTRS-HUMAN AGING	LS	150	160	86	N	N
11W	GE CLST	80B	FRONTRS-HUMAN AGING	LS	119	160	71	N	N
10F	GE CLST	M1A	GLOBAL ENVIRONMNT 1	PS	167	168	116	Y	Y
11W	GE CLST	M1B	GLOBAL ENVIRONMNT 2	LS	140	160	102	Y	Y
11S	GEOG	1	EARTH PHYS ENVIRONM	PS	46	55	38	Y	Y
11W	GEOG	1	EARTH PHYS ENVIRONM	PS	35	100	27	Y	Y
11W	GEOG	2	BIODIVR-CHNGNG WRLD	LS	146	150	125	N	Y
111	GEOG	2	BIODIVR-CHNGNG WRLD	LS	41	100	34	N	Y
11W	GEOG	5	PEOPLE&EARTH ECOSYS	PS	290	300	247	N	Y
10F	GEOG	5	PEOPLE&EARTH ECOSYS	PS	285	285	225	Y	Y
11S	GEOG	5	PEOPLE&EARTH ECOSYS	PS	249	250	206	Y	Y
111	GEOG	5	PEOPLE&EARTH ECOSYS	PS	114	165	88	N	Y
10F	GEOG	7	GEOG INFO SYSTEMS	PS	150	150	108	Y	Y
11S	GEOG	7	GEOG INFO SYSTEMS	PS	105	105	72	Y	Y
111	GEOG	7	GEOG INFO SYSTEMS	PS	34	40	22	N	Y
11W	HNRS	14	SCIENCE AND SOCIETY	LS	21	22	15	Y	N
10F	HNRS	20	NATURE-MODERN SCI	PS	31	34	15	N	N
11S	HNRS	64	ART AND AESTHETICS	LS	25	25	14	N	N
11W	HNRS	70A	GEN ENGR-MED&AG&LAW	LS	35	44	17	Y	Y
10F	HUM CS	M10A	COMPLEX SYSTEMS SCI	PS	24	24	10	N	N
11S	HUM CS	M10A	COMPLEX SYSTEMS SCI	PS	17	17	6	N	N
111	HUM CS	M10A	COMPLEX SYSTEMS SCI	PS	6	10	2	N	N
11S	LIFESCI	1	EVOLUTN&ECOL&BIODIV	LS	425	432	75	N	Y
10F	LIFESCI	1	EVOLUTN&ECOL&BIODIV	LS	411	432	106	N	Y
11W	LIFESCI	1	EVOLUTN&ECOL&BIODIV	LS	401	431	85	N	Y
111	LIFESCI	1	EVOLUTN&ECOL&BIODIV	LS	288	360	72	N	Y
11S	LIFESCI	15	LIFE-CONCPTS&ISSUES	LS	216	216	179	N	N
10F	LIFESCI	15	LIFE-CONCPTS&ISSUES	LS	215	216	180	N	N
10F	LING	1	INTR-STUDY-LANGUAGE	LS	378	378	232	N	N
11S	LING	1	INTR-STUDY-LANGUAGE	LS	376	376	207	Y	N
11W	LING	1	INTR-STUDY-LANGUAGE	LS	360	360	240	Y	N
111	LING	1	INTR-STUDY-LANGUAGE	LS	75	75	34	N	N
11S	MCD BIO	40	AIDS&SEXUAL TRANSMT	LS	67	100	44	N	N
10F	MCD BIO	50	STEM CELL BIO&PLTCS	LS	111	120	43	N	N
11W	MCD BIO	50	STEM CELL BIO&PLTCS	LS	92	96	21	N	N
11S	MCD BIO	50	STEM CELL BIO&PLTCS	LS	89	114	26	N	N
111	MCD BIO	50	STEM CELL BIO&PLTCS	LS	64	1059	64	N	N
11W	MCD BIO	98T	EMBRYONIC STEM CELL	LS	13	15	6	N	N
11W	MIMG	6	MICROBIO FOR NONMJR	LS	128	128	86	Y	N
111	MIMG	6	MICROBIO FOR NONMJR	LS	50	50	30	Y	N
11W	NEUROSC	10	NEUROSCI-21ST CENT	LS	105	105	48	N	N
11S	PHILOS	8	INTRO-PHILOS OF SCI	PS	356	356	163	Y	N
111	PHYSCI	3	INTRO-HUMAN PHYSIOL	LS	117	120	42	N	Y
10F	PHYSCI	5	HMN PHYS-DIET&EXRCS	LS	446	449	331	Y	Y
11S	PHYSCI	5	HMN PHYS-DIET&EXRCS	LS	433	433	329	N	Y
111	PHYSCI	5	HMN PHYS-DIET&EXRCS	LS	72	96	54	N	Y
111	PHYSCI	13	INTRO-HUMAN ANATOMY	LS	89	100	37	N	Y
11W	PHYSICS	10	PHYSICS	PS	147	152	118	Y	N
10F	PHYSICS	10	PHYSICS	PS	144	147	124	Y	N
111	PHYSICS	10	PHYSICS	PS	59	91	55	N	N
11W	PSYCH	15	INTRO PSYCHOBIOLOGY	LS	189	189	116	Y	N
111	PSYCH	15	INTRO PSYCHOBIOLOGY	LS	29	29	28	N	N
11W	PSYCH	M98T	DVLPMT DISABILITIES	LS	11	11	6	N	N
11S	SOC GEN	5	HUMAN BIOL&SOCIETY	LS	51	55	18	Y	N
11W	SOC GEN	101	GNTC CNCPT-HUMN SCI	LS	36	40	33	N	N
11S	SOC GEN	102W	DNA-PROMISE & PERIL	LS	126	126	38	Y	N
11S	STATS	10	INTRO-STAT REASON	PS	487	487	262	N	N
11W	STATS	10	INTRO-STAT REASON	PS	480	480	335	N	N
10F	STATS	10	INTRO-STAT REASON	PS	463	463	292	N	N
111	STATS	10	INTRO-STAT REASON	PS	302	407	220	N	N
11W	LIFESCI	2	CELLS&TISSUES&ORGNS	LS	655	672	89	N	Y
10F	LIFESCI	2	CELLS&TISSUES&ORGNS	LS	569	574	63	Y	Y
11S	LIFESCI	2	CELLS&TISSUES&ORGNS	LS	568	576	50	Y	Y
111	LIFESCI	2	CELLS&TISSUES&ORGNS	LS	239	288	51	N	Y

Term	SubjArea	Catlg#	Course Title	Credit	Wk 3 Enroll	Real Cap	Non-BS	Ladder	Lab
11S	STATS	13	STATS-LIFE&HLTH SCI	LS	186	186	26	Y	Y
10F	STATS	13	STATS-LIFE&HLTH SCI	LS	164	164	27	N	Y
11W	STATS	13	STATS-LIFE&HLTH SCI	LS	148	148	20	N	Y
111	STATS	13	STATS-LIFE&HLTH SCI	LS	95	120	21	N	Y
11W	CHEM	14BL	GEN&ORGN CHEM LAB 1	PS	350	350	28	N	Y
11S	CHEM	14BL	GEN&ORGN CHEM LAB 1	PS	288	288	32	N	Y
10F	CHEM	14BL	GEN&ORGN CHEM LAB 1	PS	244	244	30	N	Y
111	CHEM	14BL	GEN&ORGN CHEM LAB 1	PS	226	226	58	N	Y
11W	CHEM	20L	GENRL CHEMISTRY LAB	PS	391	391	11	N	Y
11S	CHEM	20L	GENRL CHEMISTRY LAB	PS	226	226	6	N	Y
10F	CHEM	20L	GENRL CHEMISTRY LAB	PS	116	116	7	N	Y
11W	PHYSICS	1A	MECHANICS	PS	601	602	38	Y	Y
11S	PHYSICS	1A	MECHANICS	PS	194	195	21	N	Y
10F	PHYSICS	1A	MECHANICS	PS	188	188	21	Y	Y
111	PHYSICS	1A	MECHANICS	PS	62	96	33	N	Y
11S	PHYSICS	1B	OSCILTNS&WAVES&FLDS	PS	570	572	25	Y	Y
10F	PHYSICS	1B	OSCILTNS&WAVES&FLDS	PS	176	178	18	N	Y
11W	PHYSICS	1B	OSCILTNS&WAVES&FLDS	PS	174	192	24	Y	Y
111	PHYSICS	1B	OSCILTNS&WAVES&FLDS	PS	113	185	40	N	Y
10F	PHYSICS	1C	ELECTRODYNMC&OPTICS	PS	296	309	13	Y	Y
11W	PHYSICS	1C	ELECTRODYNMC&OPTICS	PS	149	180	10	Y	Y
11S	PHYSICS	1C	ELECTRODYNMC&OPTICS	PS	107	172	12	Y	Y
111	PHYSICS	1C	ELECTRODYNMC&OPTICS	PS	47	95	9	Y	Y
10F	PHYSICS	6A	PHYSIC-LIFE SCI MAJ	PS	561	570	93	Y	Y
11W	PHYSICS	6A	PHYSIC-LIFE SCI MAJ	PS	383	394	53	Y	Y
11S	PHYSICS	6A	PHYSIC-LIFE SCI MAJ	PS	355	369	57	Y	Y
111	PHYSICS	6A	PHYSIC-LIFE SCI MAJ	PS	274	351	64	Y	Y
11W	PHYSICS	6B	PHYSIC-LIFE SCI MAJ	PS	565	612	52	Y	Y
10F	PHYSICS	6B	PHYSIC-LIFE SCI MAJ	PS	342	360	50	Y	Y
11S	PHYSICS	6B	PHYSIC-LIFE SCI MAJ	PS	319	368	34	Y	Y
111	PHYSICS	6B	PHYSIC-LIFE SCI MAJ	PS	282	390	66	N	Y
11S	PHYSICS	6C	PHYSIC-LIFE SCI MAJ	PS	568	575	48	Y	Y
10F	PHYSICS	6C	PHYSIC-LIFE SCI MAJ	PS	290	372	48	Y	Y
11W	PHYSICS	6C	PHYSIC-LIFE SCI MAJ	PS	271	360	41	Y	Y
111	PHYSICS	6C	PHYSIC-LIFE SCI MAJ	PS	214	330	28	N	Y
10F	CHEM	14A	EQUILBR&ACIDS&BASES	PS	1123	1155	155	N	N
11W	CHEM	14A	EQUILBR&ACIDS&BASES	PS	520	520	153	N	N
111	CHEM	14A	EQUILBR&ACIDS&BASES	PS	166	270	121	N	N
11W	CHEM	14B	THRMDN&ELCTCHM&KNTC	PS	948	1050	88	N	N
11S	CHEM	14B	THRMDN&ELCTCHM&KNTC	PS	472	472	85	N	N
111	CHEM	14B	THRMDN&ELCTCHM&KNTC	PS	59	80	27	Y	N
10F	CHEM	20A	CHEMICAL STRUCTURE	PS	1094	1094	97	Y	N
11W	CHEM	20A	CHEMICAL STRUCTURE	PS	228	235	54	Y	N
111	CHEM	20A	CHEMICAL STRUCTURE	PS	44	60	20	Y	N
11W	CHEM	20B	ENERGETICS&CHANGE	PS	689	820	42	Y	N
11S	CHEM	20B	ENERGETICS&CHANGE	PS	236	236	24	Y	N

Summary Data for 2010-2011

Total Enrollment in all FSI Courses	34437
Total Number of Courses	195
Total Number of PS courses	119
Total Number of LS courses	76
Total Number of Lab/Demo Courses	86
Total Number of courses taught by ladder faculty	91
Total Undergraduate Enrollment	25124

2011-2012 Academic Year

Term	SubjArea	Catlg#	Course Title	Credit	Wk 3 Enroll	Real Cap	Non-BS	Ladder	Lab
11F	A&O SCI	1	CLIMATE CHANGE	PS	225	270	209	Y	N
12W	A&O SCI	1	CLIMATE CHANGE	PS	173	173	140	Y	N
12S	A&O SCI	1	CLIMATE CHANGE	PS	121	168	89	Y	N
12S	A&O SCI	2	AIR POLLUTION	PS	180	180	138	N	N
11F	A&O SCI	2	AIR POLLUTION	PS	128	180	102	Y	N
12W	A&O SCI	2	AIR POLLUTION	PS	89	168	64	Y	N
121	A&O SCI	2	AIR POLLUTION	PS	18	90	13	N	N
11F	A&O SCI	3	INTR-ATMOS ENVIRMNT	PS	179	270	144	N	N
12W	A&O SCI	3	INTR-ATMOS ENVIRMNT	PS	166	168	125	N	N
11F	A&O SCI	1L	CLIMATE CHANGE LAB	PS	104	200	100	Y	Y
12W	A&O SCI	1L	CLIMATE CHANGE LAB	PS	86	100	71	Y	Y
12S	A&O SCI	1L	CLIMATE CHANGE LAB	PS	38	100	29	Y	Y
12S	A&O SCI	2L	AIR POLLUTION LAB	PS	67	100	49	N	Y
11F	A&O SCI	2L	AIR POLLUTION LAB	PS	48	100	44	Y	Y
12W	A&O SCI	2L	AIR POLLUTION LAB	PS	39	100	29	Y	Y
121	A&O SCI	2L	AIR POLLUTION LAB	PS	12	12	11	N	Y
11F	A&O SCI	3L	INTR-ATMOS ENVR LAB	PS	87	200	70	N	Y
12W	A&O SCI	3L	INTR-ATMOS ENVR LAB	PS	60	100	46	N	Y
12W	ANTHRO	7	HUMAN EVOLUTION	LS	372	375	214	Y	N
12S	ANTHRO	7	HUMAN EVOLUTION	LS	318	375	200	Y	N
121	ANTHRO	7	HUMAN EVOLUTION	LS	54	140	33	N	N
11F	ASTR	3	NATURE OF UNIVERSE	PS	308	360	246	Y	Y
12W	ASTR	3	NATURE OF UNIVERSE	PS	244	341	185	Y	Y
12S	ASTR	3	NATURE OF UNIVERSE	PS	237	360	177	Y	Y
11F	ASTR	4	BLACK HOLES	PS	119	123	71	Y	N
12S	ASTR	4	BLACK HOLES	PS	117	118	75	Y	N
12W	ASTR	5	LIFE IN THE UNIVERS	PS	135	135	94	Y	N
11F	ASTR	5	LIFE IN THE UNIVERS	PS	118	120	70	Y	N
12S	ASTR	5	LIFE IN THE UNIVERS	PS	117	117	67	Y	N
121	ASTR	5	LIFE IN THE UNIVERS	PS	92	190	60	N	N
12W	ASTR	6	CHANG CNCPT-UNIVERS	PS	64	117	46	Y	N
12W	C&EE	58SL	CLIMATE CHNG&ECOSYS	PS	24	24	17	Y	N
11F	E&S SCI	1	INTRO TO EARTH SCI	PS	69	144	46	Y	N
12W	E&S SCI	1	INTRO TO EARTH SCI	PS	48	90	20	Y	N
11F	E&S SCI	3	ASTROBIOLOGY	PS	86	90	35	Y	N
12W	E&S SCI	5	ENVIRON GEOLOGY-L A	PS	23	60	16	N	N
11F	E&S SCI	7	SPACE WEATHER	PS	40	80	32	N	N
12S	E&S SCI	8	EARTHQUAKES	PS	193	200	155	Y	Y
11F	E&S SCI	8	EARTHQUAKES	PS	188	189	154	Y	Y
12W	E&S SCI	8	EARTHQUAKES	PS	119	180	100	Y	Y
121	E&S SCI	8	EARTHQUAKES	PS	8	8	6	N	Y
12W	E&S SCI	9	SOLAR SYSTM&PLANETS	PS	112	120	86	Y	N
12S	E&S SCI	9	SOLAR SYSTM&PLANETS	PS	110	113	86	Y	N
11F	E&S SCI	9	SOLAR SYSTM&PLANETS	PS	44	66	41	Y	N
121	E&S SCI	9	SOLAR SYSTM&PLANETS	PS	18	25	16	N	N
12W	E&S SCI	13	NATURAL DISASTERS	PS	21	75	17	Y	N
11F	E&S SCI	15	INTROD-OCEANOGRAPHY	PS	289	390	182	Y	Y
12S	E&S SCI	15	INTROD-OCEANOGRAPHY	PS	65	135	53	Y	Y
121	E&S SCI	15	INTROD-OCEANOGRAPHY	PS	15	35	13	N	Y
12W	E&S SCI	17	DINOSAURS&RELATIVES	LS	261	264	195	N	N
121	E&S SCI	17	DINOSAURS&RELATIVES	LS	18	25	10	N	N
12S	E&S SCI	20	NAT HST-SOUTHRN CAL	PS	15	16	9	N	Y
11F	E&S SCI	1F	EARTH SCI-FIELDWORK	PS	26	83	13	Y	Y
12W	E&S SCI	1F	EARTH SCI-FIELDWORK	PS	20	20	12	Y	Y
11F	EE BIOL	17	EVOLTN FOR EVERYONE	LS	75	80	47	N	N
12S	EE BIOL	17	EVOLTN FOR EVERYONE	LS	49	80	34	Y	N
12W	EE BIOL	25	LIVING OCEAN	LS	70	80	45	N	N
121	ENGR	M10A	COMPLEX SYSTEMS SCI	PS	25	25	7	N	N
121	ENVIRON	12	SUSTNBLTY&ENVIRNMNT	PS	32	60	17	Y	N
11F	GE CLST	70A	COSMOS AND LIFE	PS	204	204	187	Y	Y
12W	GE CLST	70B	COSMOS AND LIFE	LS	168	200	155	Y	Y
12S	GE CLST	70CW	COSMOS AND LIFE	LS	163	163	151	N	N
11F	GE CLST	72A	SEX-BIOLOGY-SOCIETY	LS	189	240	148	Y	N
12W	GE CLST	72B	SEX-BIOLOGY-SOCIETY	LS	157	240	122	Y	N

Term	SubjArea	Catlg#	Course Title	Credit	Wk 3 Enroll	Real Cap	Non-BS	Ladder	Lab
11F	GE CLST	80A	FRONTRS-HUMAN AGING	LS	89	132	66	N	N
12W	GE CLST	80B	FRONTRS-HUMAN AGING	LS	65	80	51	N	N
11F	GE CLST	M1A	GLOBAL ENVIRONMNT 1	PS	141	200	98	Y	Y
12W	GE CLST	M1B	GLOBAL ENVIRONMNT 2	LS	125	180	92	Y	Y
11F	GEOG	1	EARTH PHYS ENVIRONM	PS	80	100	71	Y	Y
12W	GEOG	2	BIODIVR-CHNGNG WRLD	LS	108	150	78	Y	Y
121	GEOG	2	BIODIVR-CHNGNG WRLD	LS	30	50	20	N	Y
12S	GEOG	5	PEOPLE&EARTH ECOSYS	PS	401	401	349	N	Y
12W	GEOG	5	PEOPLE&EARTH ECOSYS	PS	323	323	268	N	Y
11F	GEOG	5	PEOPLE&EARTH ECOSYS	PS	297	297	251	Y	Y
121	GEOG	5	PEOPLE&EARTH ECOSYS	PS	107	200	87	N	Y
12S	GEOG	7	GEOG INFO SYSTEMS	PS	155	155	96	Y	Y
11F	GEOG	7	GEOG INFO SYSTEMS	PS	152	160	79	N	Y
121	GEOG	7	GEOG INFO SYSTEMS	PS	21	32	20	N	Y
12W	HNRS	14	SCIENCE AND SOCIETY	LS	19	20	13	Y	N
11F	HNRS	20	NATURE-MODERN SCI	PS	26	34	9	N	N
12W	HNRS	64	ART AND AESTHETICS	LS	25	25	20	N	N
12W	HNRS	70A	GEN ENGR-MED&AG&LAW	LS	34	44	22	Y	Y
11F	HUM CS	M10A	COMPLEX SYSTEMS SCI	PS	20	20	10	N	N
12W	LIFESCI	1	EVOLUTN&ECOL&BIODIV	LS	658	720	144	N	Y
12S	LIFESCI	1	EVOLUTN&ECOL&BIODIV	LS	544	576	136	N	Y
11F	LIFESCI	1	EVOLUTN&ECOL&BIODIV	LS	522	576	121	Y	Y
121	LIFESCI	1	EVOLUTN&ECOL&BIODIV	LS	288	408	76	N	Y
11F	LIFESCI	15	LIFE-CONCPTS&ISSUES	LS	284	288	212	N	N
12S	LIFESCI	15	LIFE-CONCPTS&ISSUES	LS	217	217	185	N	N
12W	LIFESCI	15	LIFE-CONCPTS&ISSUES	LS	215	216	178	N	N
11F	LING	1	INTR-STUDY-LANGUAGE	LS	436	436	265	Y	N
12S	LING	1	INTR-STUDY-LANGUAGE	LS	414	420	240	N	N
12W	LING	1	INTR-STUDY-LANGUAGE	LS	379	379	268	Y	N
121	LING	1	INTR-STUDY-LANGUAGE	LS	126	1998	55	N	N
12W	MATH	98T	IMAGE SEGMENTATN	PS	6	12	2	N	N
11F	MCD BIO	40	AIDS&SEXUAL TRANSMT	LS	111	120	81	N	N
12S	MCD BIO	40	AIDS&SEXUAL TRANSMT	LS	49	60	33	N	N
11F	MCD BIO	50	STEM CELL BIO&PLTCS	LS	119	132	31	N	N
12S	MCD BIO	50	STEM CELL BIO&PLTCS	LS	103	108	41	N	N
12W	MCD BIO	50	STEM CELL BIO&PLTCS	LS	92	96	22	N	N
121	MCD BIO	50	STEM CELL BIO&PLTCS	LS	28	50	28	N	N
121	MCD BIO	70	GENETIC ENGR&SOCTY	LS	48	80	42	Y	Y
12W	MIMG	6	MICROBIO FOR NONMJR	LS	129	129	86	Y	N
121	MIMG	6	MICROBIO FOR NONMJR	LS	34	50	22	Y	N
12S	MIMG	98T	DRUG-RESIST INFECT	LS	17	17	11	N	N
12W	NEUROSC	10	NEUROSCI-21ST CENT	LS	93	93	40	N	N
12W	PHILOS	8	INTRO-PHILOS OF SCI	PS	192	192	119	Y	N
121	PHYSCI	3	INTRO-HUMAN PHYSIOL	LS	95	120	29	N	Y
11F	PHYSCI	5	HMN PHYS-DIET&EXRCS	LS	420	420	332	N	Y
12S	PHYSCI	5	HMN PHYS-DIET&EXRCS	LS	415	420	261	N	Y
12W	PHYSCI	5	HMN PHYS-DIET&EXRCS	LS	412	420	271	N	Y
121	PHYSCI	5	HMN PHYS-DIET&EXRCS	LS	78	96	57	N	Y
12S	PHYSCI	7	SCIENCE AND FOOD	PS	30	48	12	Y	Y
121	PHYSCI	13	INTRO-HUMAN ANATOMY	LS	130	150	52	N	Y
12W	PHYSICS	10	PHYSICS	PS	164	174	143	Y	N
11F	PHYSICS	10	PHYSICS	PS	115	130	91	N	N
121	PHYSICS	10	PHYSICS	PS	76	91	72	N	N
11F	PSYCH	15	INTRO PSYCHOBIOLOGY	LS	262	262	149	N	N
12W	PSYCH	15	INTRO PSYCHOBIOLOGY	LS	177	300	97	Y	N
12S	PSYCH	15	INTRO PSYCHOBIOLOGY	LS	176	176	99	N	N
121	PSYCH	15	INTRO PSYCHOBIOLOGY	LS	35	50	34	N	N
11F	SOC GEN	5	HUMAN BIOL&SOCIETY	LS	123	125	36	Y	N
12W	SOC GEN	5	HUMAN BIOL&SOCIETY	LS	59	60	33	Y	N
12W	SOC GEN	101	GNTC CNCPT-HUMN SCI	LS	25	42	22	N	N
12S	SOC GEN	M102	MDCL ISS-HUMN GNTCS	LS	113	120	25	Y	N
12S	STATS	10	INTRO-STAT REASON	PS	830	830	437	N	N
11F	STATS	10	INTRO-STAT REASON	PS	631	631	345	N	N
12W	STATS	10	INTRO-STAT REASON	PS	622	622	365	N	N
121	STATS	10	INTRO-STAT REASON	PS	306	407	227	N	N
12S	STATS	13	STATS-LIFE&HLTH SCI	LS	168	175	24	Y	Y

Term	SubjArea	Catlg#	Course Title	Credit	Wk 3 Enroll	Real Cap	Non-BS	Ladder	Lab
11F	STATS	13	STATS-LIFE&HLTH SCI	LS	162	162	19	N	Y
12W	STATS	13	STATS-LIFE&HLTH SCI	LS	159	163	14	N	Y
121	STATS	13	STATS-LIFE&HLTH SCI	LS	85	120	16	N	Y
12W	CHEM	14BL	GEN&ORGN CHEM LAB 1	PS	396	396	35	N	Y
121	CHEM	14BL	GEN&ORGN CHEM LAB 1	PS	361	361	61	N	Y
12S	CHEM	14BL	GEN&ORGN CHEM LAB 1	PS	293	293	30	N	Y
11F	CHEM	14BL	GEN&ORGN CHEM LAB 1	PS	280	280	20	N	Y
12W	CHEM	20L	GENRL CHEMISTRY LAB	PS	358	358	12	N	Y
12S	CHEM	20L	GENRL CHEMISTRY LAB	PS	239	239	11	N	Y
11F	CHEM	20L	GENRL CHEMISTRY LAB	PS	144	144	8	N	Y
12W	PHYSICS	1A	MECHANICS	PS	825	831	62	Y	Y
12S	PHYSICS	1A	MECHANICS	PS	287	344	46	Y	Y
11F	PHYSICS	1A	MECHANICS	PS	182	188	31	N	Y
121	PHYSICS	1A	MECHANICS	PS	53	96	31	N	Y
12S	PHYSICS	1B	OSCILTNS&WAVES&FLDS	PS	716	752	32	Y	Y
12W	PHYSICS	1B	OSCILTNS&WAVES&FLDS	PS	194	196	16	Y	Y
11F	PHYSICS	1B	OSCILTNS&WAVES&FLDS	PS	186	186	23	N	Y
121	PHYSICS	1B	OSCILTNS&WAVES&FLDS	PS	112	185	21	N	Y
11F	PHYSICS	1C	ELECTRODYNMC&OPTICS	PS	315	315	23	Y	Y
12W	PHYSICS	1C	ELECTRODYNMC&OPTICS	PS	171	188	9	Y	Y
12S	PHYSICS	1C	ELECTRODYNMC&OPTICS	PS	128	172	14	Y	Y
121	PHYSICS	1C	ELECTRODYNMC&OPTICS	PS	93	120	17	Y	Y
11F	PHYSICS	6A	PHYSIC-LIFE SCI MAJ	PS	549	571	61	Y	Y
12W	PHYSICS	6A	PHYSIC-LIFE SCI MAJ	PS	364	394	55	Y	Y
12S	PHYSICS	6A	PHYSIC-LIFE SCI MAJ	PS	353	354	72	Y	Y
121	PHYSICS	6A	PHYSIC-LIFE SCI MAJ	PS	270	360	52	Y	Y
12W	PHYSICS	6B	PHYSIC-LIFE SCI MAJ	PS	602	602	49	Y	Y
12S	PHYSICS	6B	PHYSIC-LIFE SCI MAJ	PS	350	359	35	Y	Y
11F	PHYSICS	6B	PHYSIC-LIFE SCI MAJ	PS	333	361	35	Y	Y
121	PHYSICS	6B	PHYSIC-LIFE SCI MAJ	PS	261	390	60	N	Y
12S	PHYSICS	6C	PHYSIC-LIFE SCI MAJ	PS	587	606	52	Y	Y
12W	PHYSICS	6C	PHYSIC-LIFE SCI MAJ	PS	337	361	27	Y	Y
11F	PHYSICS	6C	PHYSIC-LIFE SCI MAJ	PS	333	375	32	N	Y
121	PHYSICS	6C	PHYSIC-LIFE SCI MAJ	PS	237	330	29	N	Y
12S	LIFESCI	2	CELLS&TISSUES&ORGNS	LS	720	720	77	Y	N
12W	LIFESCI	2	CELLS&TISSUES&ORGNS	LS	633	648	74	Y	N
11F	LIFESCI	2	CELLS&TISSUES&ORGNS	LS	632	648	69	Y	N
121	LIFESCI	2	CELLS&TISSUES&ORGNS	LS	265	333	64	N	N
11F	CHEM	14A	EQUILBR&ACIDS&BASES	PS	1481	1500	170	N	N
12W	CHEM	14A	EQUILBR&ACIDS&BASES	PS	560	560	174	N	N
121	CHEM	14A	EQUILBR&ACIDS&BASES	PS	140	240	107	N	N
12W	CHEM	14B	THRMDN&ELCTCHM&KNTC	PS	1209	1285	109	N	N
12S	CHEM	14B	THRMDN&ELCTCHM&KNTC	PS	555	585	111	N	N
121	CHEM	14B	THRMDN&ELCTCHM&KNTC	PS	74	100	41	Y	N
11F	CHEM	20A	CHEMICAL STRUCTURE	PS	1063	1125	62	Y	N
12W	CHEM	20A	CHEMICAL STRUCTURE	PS	226	235	45	N	N
121	CHEM	20A	CHEMICAL STRUCTURE	PS	99	180	69	Y	N
11F	CHEM	20AH	CHEM STRUCTURE-HNRS	PS	41	50	8	Y	N
12W	CHEM	20B	ENERGETICS&CHANGE	PS	747	820	40	Y	N
12S	CHEM	20B	ENERGETICS&CHANGE	PS	161	235	24	Y	N
12W	CHEM	20BH	ENRGTCS&CHANGE-HNRS	PS	26	50	1	Y	N

Summary Data for 2011-2012

Total Enrollment in all FSI Courses	38790
Total Number of Courses	203
Total Number of PS courses	117
Total Number of LS courses	86
Total Number of Lab/Demo Courses	84
Total Number of courses taught by ladder faculty	91
Total Undergraduate Enrollment	26242

Appendix E—List of Current Foundations of Scientific Inquiry General Education classes

*31. Introduction to Southeast Asia (Formerly numbered Southeast Asian Studies 1)
*33. Introduction to East Asia

Islamics (Near Eastern Languages)
*M107. Islam in West (Same as Arabic M107 and Religion M107)

Korean (Asian Languages)
40. Korean Wave: Globalization of South Korean Pop Culture

Lesbian, Gay, Bisexual, and Transgender Studies
*M114. Introduction to Lesbian, Gay, Bisexual, and Transgender Studies (Same as Gender Studies M114)
*M137. Lesbian, Gay, Bisexual, Transgender, and Queer Perspectives in Pop Music (Same as Music History M137)

Molecular, Cell, and Developmental Biology
*50. Stem Cell Biology, Politics, and Ethics: Teasing Apart Issues

Music History (Musicology)
*M137. Lesbian, Gay, Bisexual, Transgender, and Queer Perspectives in Pop Music (Same as Lesbian, Gay, Bisexual, and Transgender Studies M137)

Philosophy
*6. Introduction to Political Philosophy

Political Science
10. Introduction to Political Theory
20. World Politics
40. Introduction to American Politics
50. Introduction to Comparative Politics
M115C. Citizenship and Public Service (Same as Civic Engagement M115)

Religion, Study of
11. Religion in Los Angeles
*M40. Christianities East and West (Same as Slavic M40)
*M107. Islam in West (Same as Arabic M107 and Islamics M107)

Scandinavian
*138. Vikings

Slavic (Slavic Languages)
*M40. Christianities East and West (Same as Religion M40)
*87. Languages of Los Angeles

Social Welfare
M108. Biomedical, Social, and Policy Frontiers in Human Aging (Same as Gerontology M108)

Society and Genetics
*5. Integrative Approaches to Human Biology and Society
*M102. Societal and Medical Issues in Human Genetics (Same as Human Genetics CM136C)

Sociology
1. Introductory Sociology
*M5. Social Organization of Black Communities (Same as Afro-American Studies M5)
10. Social Thought and Origins of Sociology
51. Sociology of Migration

Statistics
12. Introduction to Statistical Methods for Geography and Environmental Studies

World Arts and Cultures (World Arts and Cultures/Dance)
M23. Introduction to American Indian Studies (Same as American Indian Studies M10)
*33. Indigenous Worldviews
*51W. Aliens, Psychics, and Ghosts **(W)**

Foundations of Scientific Inquiry

The aim of courses in this area is to ensure that students gain a fundamental understanding of how scientists formulate and answer questions about the operation of both the physical and biological world. The courses also deal with some of the most important issues, developments, and methodologies in contemporary science, addressing such topics as the origin of the universe, environmental degradation, and the decoding of the human genome. Through lectures, laboratory experiences, writing, and intensive discussions, students consider the important roles played by the laws of physics and chemistry in society, biology, Earth and environmental sciences, and astrophysics and cosmology.

Life Sciences

Anthropology
7. Human Evolution (5 units)
12. Principles of Human Evolution: Comparative Analysis (5 units)

Archaeology
*30. Science in Archaeology (4 units)

Astronomy (Physics and Astronomy)
*5. Life in Universe (4 units)

Civil and Environmental Engineering
*58SL. Climate Change, Water Quality, and Ecosystem Functioning (5 units)

Earth and Space Sciences
*3. Astrobiology (5 units)
*15. Blue Planet: Introduction to Oceanography (5 units) **(L/D)**
16. Major Events in History of Life (4 units)
*17. Dinosaurs and Their Relatives (5 units) **(L/D)**
*20. Natural History of Southern California (5 units) **(L/D)**

Ecology and Evolutionary Biology
10. Plants and Civilization (4 units)
11. Biomedical Research Issues in Minority Communities (5 units)
13. Evolution of Life (4 units)
17. Evolution for Everyone (5 units)
18. Why Ecology Matters: Science Behind Environmental Issues (5 units)
25. Living Ocean (5 units)

Environment
*12. Sustainability and Environment

Geography
2. Biodiversity in Changing World (5 units) **(L/D)**
*5. People and Earth's Ecosystems (5 units) **(L/D)**
*7. Introduction to Geographic Information Systems (5 units) **(L/D)**
*88GE. Seminar Sequence: Special Topics in Geography (5 units)

Honors Collegium
3. Personal Brain Management (5 units)
14. Interaction of Science and Society (5 units)
*41. Understanding Ecology: Finding Interdisciplinary Solutions to Environmental Problems (5 units)
64. Neuroscience and Psychology of Art and Biology of Aesthetics (5 units)
70A. Genetic Engineering in Medicine, Agriculture, and Law (5 units) **(L/D)**

Human Genetics
*CM136C. Societal and Medical Issues in Human Genetics (Same as Society and Genetics M102)

Life Sciences
1. Evolution, Ecology, and Biodiversity (5 units) **(L/D)**
2. Cells, Tissues, and Organs (4 units)
15. Life: Concepts and Issues (5 units)

Linguistics
*1. Introduction to Study of Language (5 units)

Microbiology, Immunology, and Molecular Genetics
5. Science of Memory and Learning (4 units)
6. Microbiology for Nonmajors (4 units)

7. Developments in Biotechnology (4 units)
12. Biological Threats to Society: Bioterrorism and Emerging Infections (4 units)

Molecular, Cell, and Developmental Biology

40. AIDS and Other Sexually Transmitted Diseases (5 units)
*50. Stem Cell Biology, Politics, and Ethics: Teasing Apart Issues (5 units)
70. Genetic Engineering and Society (5 units) **(L/D)**
80. Green World: Plant Biology for Now and Future (5 units) **(L/D)**

Neuroscience

10. Brain Made Simple: Neuroscience for 21st Century (4 units)

Nursing

3. Human Physiology for Healthcare Providers (5 units) **(L/D)**
13. Introduction to Human Anatomy (5 units) **(L/D)**

Physiological Science (Integrative Biology and Physiology)

3. Introduction to Human Physiology (5 units) **(L/D)**
5. Issues in Human Physiology: Diet and Exercise (5 units) **(L/D)**
*7. Science and Food: Physical and Molecular Origins of What We Eat (5 units) **(L/D)**
13. Introduction to Human Anatomy (5 units) **(L/D)**

Psychology

15. Introductory Psychobiology (4 units)

Society and Genetics

*5. Integrative Approaches to Human Biology and Society (5 units)
101. Genetic Concepts for Human Sciences (5 units)
*M102. Societal and Medical Issues in Human Genetics (Same as Human Genetics CM136C)

Statistics

*10. Introduction to Statistical Reasoning (5 units)
13. Introduction to Statistical Methods for Life and Health Sciences (5 units) **(L/D)**

Physical Sciences

Archaeology

*30. Science in Archaeology (4 units)

Astronomy (Physics and Astronomy)

3. Nature of Universe (5 units) **(L/D)**
4. Black Holes and Cosmic Catastrophes (4 units)
*5. Life in Universe (4 units)
6. Cosmology: Our Changing Concepts of Universe (4 units)
7. Astronomy and Media (4 units)

Atmospheric and Oceanic Sciences

1. Climate Change: From Puzzles to Policy (4 units)
1L. Climate Change: From Puzzles to Policy — Laboratory (1 unit) **(L/D)**
2. Air Pollution (4 units)
2L. Air Pollution Laboratory (1 unit) **(L/D)**
3. Introduction to Atmospheric Environment (4 units)
3L. Introduction to Atmospheric Environment Laboratory (1 unit) **(L/D)**
5. Climates of Other Worlds (4 units)

Chemistry and Biochemistry

2. Introductory Chemistry (4 units)
14A. Atomic and Molecular Structure, Equilibria, Acids, and Bases (4 units)
14B. Thermodynamics, Electrochemistry, Kinetics, and Organic Chemistry (4 units)
14BL. General and Organic Chemistry Laboratory I (3 units) **(L/D)**
20A. Chemical Structure (4 units)
20AH. Chemical Structure (Honors) (4 units)
20B. Chemical Energetics and Change (4 units)
20BH. Chemical Energetics and Change (Honors) (4 units)
20L. General Chemistry Laboratory (3 units) **(L/D)**

Civil and Environmental Engineering

*58SL. Climate Change, Water Quality, and Ecosystem Functioning (5 units)

Earth and Space Sciences

1. Introduction to Earth Science (5 units) **(L/D)**
*3. Astrobiology (5 units)
5. Environmental Geology of Los Angeles (4 units)
7. Perils of Space: Introduction to Space Weather (4 units)
8. Earthquakes (5 units) **(L/D)**
9. Solar System and Planets (4 units)
10. Exploring Mars, Red Planet (4 units)
13. Natural Disasters (5 units)
*15. Blue Planet: Introduction to Oceanography (5 units) **(L/D)**
*17. Dinosaurs and Their Relatives (5 units) **(L/D)**
*20. Natural History of Southern California (5 units) **(L/D)**

Engineering

*10A. Introduction to Complex Systems Science (5 units)

Environment

*12. Sustainability and Environment

Geography

1. Earth's Physical Environment (5 units) **(L/D)**
*5. People and Earth's Ecosystems (5 units) **(L/D)**
*7. Introduction to Geographic Information Systems (5 units) **(L/D)**
*88GE. Seminar Sequence: Special Topics in Geography (5 units)

Honors Collegium

*20. What Is This Thing Called Science?: Nature of Modern Science (5 units)

Philosophy

*8. Introduction to Philosophy of Science (5 units)

Physics (Physics and Astronomy)

1A. Physics for Scientists and Engineers: Mechanics (5 units) **(L/D)**
1AH. Physics for Scientists and Engineers: Mechanics (Honors) (5 units) **(L/D)**
1B. Physics for Scientists and Engineers: Oscillations, Waves, Electric and Magnetic Fields (5 units) **(L/D)**
1BH. Physics for Scientists and Engineers: Oscillations, Waves, Electric and Magnetic Fields (Honors) (5 units) **(L/D)**
1C. Physics for Scientists and Engineers: Electrodynamics, Optics, and Special Relativity (5 units) **(L/D)**
1CH. Physics for Scientists and Engineers: Electrodynamics, Optics, and Special Relativity (Honors) (5 units) **(L/D)**
6A. Physics for Life Sciences Majors: Mechanics (5 units) **(L/D)**
6AH. Physics for Life Sciences Majors: Statics and Dynamics (Honors) (5 units) **(L/D)**
6B. Physics for Life Sciences Majors: Waves, Electricity, and Magnetism (5 units) **(L/D)**
6BH. Physics for Life Sciences Majors: Sound, Light, and Hydrodynamics (Honors) (5 units) **(L/D)**
6C. Physics for Life Sciences Majors: Light, Fluids, Thermodynamics, Modern Physics (5 units) **(L/D)**
6CH. Physics for Life Sciences Majors: Electricity, Magnetism, and Transport (Honors) (5 units) **(L/D)**
10. Physics (4 units)

Physiological Science (Integrative Biology and Physiology)

*7. Science and Food: Physical and Molecular Origins of What We Eat (5 units) **(L/D)**

Statistics

*10. Introduction to Statistical Reasoning (5 units)