ESSAY C

UCLA's Capstone Initiative: Engaging Students in Creative Discovery

Background

UCLA's *Institutional Proposal*[1] to WASC envisions the Capstone Initiative as a bookend to the successful transformation of the General Education program that was the curricular focus of UCLA's last reaccreditation. Whereas general education offers beginning students foundational knowledge across a breadth of fields, capstones serve as culminating experiences that challenge advanced students to apply their acquired general and disciplinary-based knowledge and skills to a project grounded in a focused course of study. These projects demonstrate core competencies, and engage students' individual creativity, research ability, artistic or critical proficiency, and personal reflection. Additional skills and knowledge resulting from capstone experiences encourage students to embark on longer-term pathways of academic and personal discovery.

In parallel to its decade-long transformation of general education, UCLA is now in the process of engaging interested departments in discussions about implementing capstones within their undergraduate majors. The long-term goal is to broaden substantially the availability of undergraduate capstone experiences by UCLA's centennial in 2019. We are encouraged by the WASC Site Visit Team's confidence that "given UCLA's success in General Education, the results of the work on capstones could well become a national model." In its report[2], the team noted:

> *The development of the Capstone Initiative has been a very thoughtful process that has engaged faculty from across the divisions and Schools. By beginning with existing academic processes (i.e. senior seminars and honors theses) and respecting their roles in individual programs as well as the variation that exists across broad disciplinary approaches, UCLA has developed standards for capstone experiences that are substantive, broadly applicable and consistent with high faculty ownership across the diversity of undergraduate programs.*

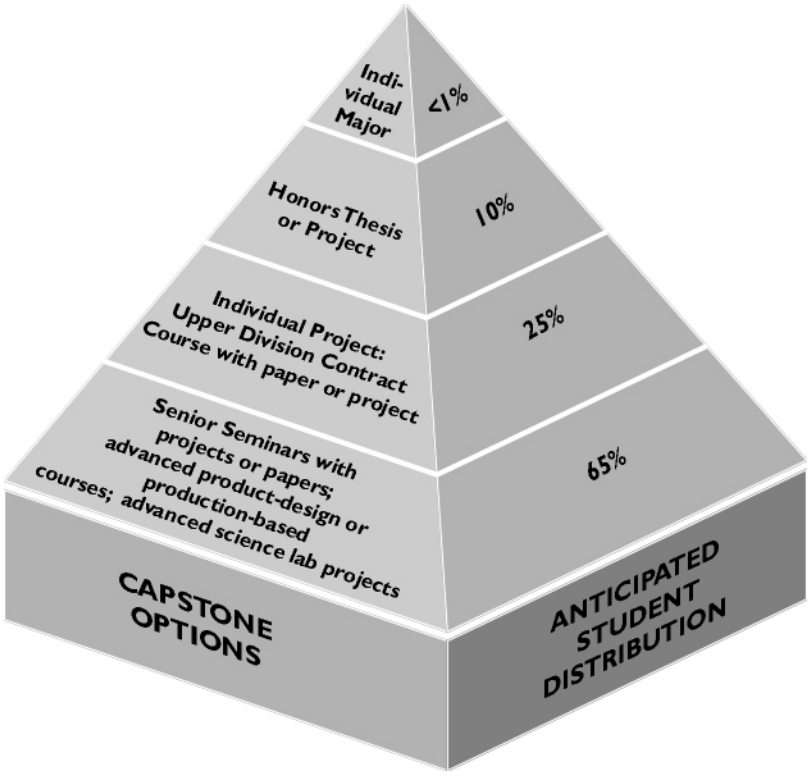
In *Essay 5*[3] of our *Capacity* report, we proposed a model for capstones that builds on a curriculum with core requirements and a progression of electives that lead to a culminating experience. Capstone options also build on the success of existing experiences and allow for broad applicability across our diverse programs. In that essay, prepared by a cross-disciplinary group of deans, current and former department chairs, and current and former leaders of the Undergraduate Council, we identified five criteria for UCLA capstone experiences:

1. The project must require the student to engage in a creative, inquiry-based learning experience that deepens the student's knowledge and integration of the discipline.
2. The project may be completed individually or by a group of peers, provided each student is given agency; each student's contribution must be significant, identifiable, and graded.
3. The project must culminate in a tangible product that can be archived (including film, video, etc.) for at least three years by the responsible unit (department or program).
4. The project must be part of an upper-division course of at least four units, usually within the curriculum established for the student's major or minor.
5. Opportunities should be provided for capstones to be shared within a broader community, such as presenting a paper at a student or professional meeting.

These criteria were endorsed unanimously and "with enthusiasm" by the Undergraduate Council in Fall 2007, along with the four levels of capstone options illustrated in Figure 1. The four levels represent different expectations for student engagement and independence, ranging from advanced senior seminars or project courses that require a comprehensive term paper, performance, or product design, to individually designed majors. The percentages listed indicate the expected

participation of seniors at each of the four levels. It should be noted that some students might complete capstones at more than one level; for example, a student, having completed an advanced seminar, might decide to engage in an independent study or honors project.

Figure 1. UCLA's Capstone Options by Level and Anticipated Rates of Student Participation



In this essay, we update our Capstone Initiative efforts and discuss future plans. In doing so, we discuss the: 1) Workgroup's identification and survey of UCLA's inaugural Capstone Majors; 2) Undergraduate Council's implementation of a process for certifying Capstone Majors; 3) College's analysis of Senior Survey data about capstone experiences; 4) campus plans for, and progress in, responding to departmental interest in the Initiative; and 5) timeline for establishing a process for assessing capstone experiences (also see *Essay B*). The decision to align the Capstone Initiative with having the faculty articulate learning outcomes and then consider the assessment framework, which was discussed in *Essay B*, has aided the process of setting standards for UCLA capstones and establishing a capstone certification process. Capstones bring into focus programmatic outcomes for the major, and the assessment of students' capstone performances serves as an effective diagnostic tool to facilitate the curricular review and reform process.

Identification and Survey of UCLA's Inaugural Capstone Majors

With approval of the capstone criteria in hand, the Workgroup reviewed course requirements for all UCLA undergraduate majors to identify those that already appeared to require a course (or sequence) meeting the approved criteria. By first focusing on these selected majors and surveying them rather than all programs (the original plan per *Essay 5* in our *Capacity* report), the Workgroup established a solid foundation for future efforts by:

- providing thorough documentation of how existing capstones are designed and sustained, as a foundation for expanding opportunities across campus;

- assisting the development of standards and overall process for certifying Capstone Majors by the Undergraduate Council; and
- establishing carefully and explicitly the relationship between capstones and larger programmatic goals, expressed as learning outcomes.

In Winter 2008, educational researchers and administrative staff from the office of the Vice Provost for Undergraduate Education, in collaboration with Workgroup leaders, developed a list of 38 degree-granting programs that appeared to require a capstone for undergraduates. The Workgroup then developed a Capstone Survey that, along with the list of 38 programs, was reviewed and approved by the Undergraduate Council on March 7, 2008. Later that month, the survey and a cover letter, co-signed by the chairs of the Capstone Workgroup and the Undergraduate Council, were distributed. The letter[4] invited departments to apply for their identified major(s) to be included among the inaugural set of "Capstone Majors." Toward that end, the survey[5] asked them to verify the description of their requirement and confirm that it satisfied the five criteria specified by the UCLA Capstone Model, explain the "goals for students undertaking capstones," and describe procedures for "evaluating capstone courses and experiences."

Table 1 summarizes program responses. Of the 38 programs surveyed, 29 completed the application by October 2008 (column B); the remaining nine programs expressed commitment to complete their applications within the 2008-09 academic year (column C). As a group, these 38 majors constitute 30% of UCLA's 125 baccalaureate degree programs (columns D and E).

Table 1. Summary of 2008 Capstone Survey Responses by Academic Unit

UCLA's units offering bachelor's degrees: College Divisions, Institutes, Schools, and Special Programs	A. Degree-granting programs surveyed by Workgroup	B. Applications completed and approved by Workgroup October 2008	C. Programs committed to complete application by end of 2008-09	D. Total degree-granting programs in each academic unit	E. % of Total surveyed [A/D x 100]
Arts and Architecture	4	2	2	7	57%
Engineering	9	9	0	9	100%
Honors "Individual Major"	0	0	0	1	0%
Humanities Division	8	8	0	47	17%
Institute of the Environment	1	1	0	1	100%
International Institute	4	1	3	7	57%
Life Sciences Division	4	4	0	11	36%
Nursing	0	0	0	1	0%
Physical Sciences Division	4	4	0	23	17%
Social Sciences Division	2	0	2	16	13%
Theater, Film, and TV	2	0	2	2	100%
Total	**38**	**29**	**9**	**125**	**30%**

Beginning in Summer 2008 and continuing through 2008-09, a small team of Council and Workgroup faculty members, along with staff from the Vice Provost's office, assisted faculty in completing the application, giving particular emphasis to the articulation of capstone learning outcomes and their assessment. As part of the capstone application, faculty also completed an *Inventory of Educational Effectiveness Indicators* (see Table 4 of *Essay B*).

Certification of the Inaugural Capstone Majors

The Workgroup met on October 14, 2008 to review the first set of completed capstone applications. Individual members were assigned to review and comment on those most closely related to their field of expertise. At the conclusion of the meeting, the Workgroup had approved 29 applications for Council review and certification. On October 17, the Workgroup Chair met with Undergraduate Council to present the slate of applications, a letter[6] summarizing the Workgroup's actions, and complete sets of the application materials for all members. Samples[7] of completed capstone applications were also posted and updated as certification progressed.

At Council, a general discussion led to the decision that the Workgroup also should request a memo from each chair detailing the involvement of the faculty in reviewing and endorsing the application, including the learning outcomes. These letters were to be added to the program's application before Council's Curriculum Committee reviewed it.

To obtain these memos, an email[8] was sent to chairs. Some responded immediately; others waited until a full meeting of the faculty could be scheduled. The received letters indicated a high level of faculty involvement in the process, and many provided important insights into the process of engaging faculty in discussion of a capstone requirement. Some described the capstone as already an important program component and expressed faculty pride in students' accomplishments and the inclusion of their program as one of UCLA's inaugural Capstone Majors:

> *Capstones, in the form of design courses that integrate foundation material in the majors, are a longstanding feature of our engineering programs…. Since our existing curricular structure appears to satisfy the criteria for a capstone major, we* [are] *pleased to become a part of the Capstone Initiative.* [Henry Samueli School of Engineering and Applied Sciences]

> *Our capstone course was develop*[ed] *about five years ago as part of our major…. The faculty were unanimous in endorsing the course and, in fact, we managed to get some more support in the form of offering to help supervise student projects*…[and]…*some constructive and supportive comments and discussion.* [Statistics]

> *The department…is indeed pleased to present a proposal, according to which its undergraduate majors would officially become Capstone Majors….Our department already requires a junior/senior seminar (Classics 191) of all majors, the basic purpose of which is congruent with the intentions of the Capstone requirement.* [Classics]

Memos from other chairs detailed the processes by which capstone experiences and the curricula that support them have **"**evolved," and continue to be "fine tuned." A common point of emphasis was that "the faculty worked hard at defining the capstone experiences" through a collaborative process over several years. Multiple goals of capstones were articulated, including "allow[ing] the student to integrate his/her learning in a unique and meaningful way" and seeking to make capstones "practical" and "sustainable." In a few cases, the value of "developing several emphases with capstones so our students [are] better prepared for more varied careers" was also underscored:

> *…the issue of capstones has been discussed at faculty meetings at least three times each quarter….It has taken three years to develop and integrate the capstone requirement into our curriculum…* [Ethnomusicology]

> *Our department has always required upper-division seminars of both its majors and minors, and in the past few years we have paid particular attention to redesigning this experience, for our majors, as a capstone, with a more substantial product and a more directed aim that it culminates our program.* [Musicology]

In a few departments, such as History and English, required upper division seminars have been taught for many years with the understanding that students "should write a serious research paper."

The Capstone Major application process, however, engaged faculty in new dialogue about recasting the major and the role of the upper division seminar requirement:

> *Since* [the] *191*[seminar] *was already functioning in many ways as a capstone course for the History major, the task of changing it into a capstone has been mainly one of making explicit the goals and requirements. We talked generally [in two departmental meetings] about restructuring the major to encourage students to develop programs of courses that build on one another. The department [also] discussed the proposed learning outcomes and procedures for keeping a…sample of papers as a basis for evaluating the seminars. I think everyone regarded them as formalization of what we were already doing rather than starting a new program, and the capstone proposal seemed to have unanimous assent.* [History]

The chairs' memos were reviewed by the Workgroup chair and then sent to the Curriculum Committee, which began its review. Because several members were new to Council and unfamiliar with the history of UCLA's Capstone Initiative, the Committee initially spent time reviewing the capstone model and criteria, as well as the process by which the Capstone Workgroup selected and surveyed the 38 departments. These discussions led to lively interactions between the Committee and the Workgroup.

In the course of their review, the Co-Chairs of the Curriculum Committee provided periodic updates to Council, expressing support for the initiative while communicating key issues that were raised in Committee discussions. These included:

1. Are there capstone prerequisites that prepared students for the experience?
2. Are learning outcomes consistent with the nature of the capstone experience?
3. Are students required to present their projects in class or to a broader audience?

The Committee and Workgroup differed on the last question. The Workgroup had treated the fifth criterion (i.e., "Opportunities should be provided for capstones to be shared within a broader community…") as aspirational; this point had been explicitly raised earlier when the proposal was submitted to the Undergraduate Council for endorsement. The Committee, however, felt student presentation of capstone projects was key to the experience and requested assurance that programs applying for capstone certification would satisfy this criterion. The Committee's concern led eventually to a rewording of the fifth capstone criterion, which was approved by Council:

> *Opportunities must be available or developed for students to share their capstone products (paper, performance, or project) publicly. Examples might be a presentation to a peer audience such as a class, a departmental mini-conference, or a research group meeting; a poster at a department or campus venue or professional meeting; campus music, dance, theater or art event; or a competition that is judged by the professional community in the discipline.*

The Curriculum Committee's systematic review of the capstone applications took place over a series of meetings and, on February 20, 2009, the Committee presented a slate of 18 majors for capstone certification. Council unanimously approved the slate and, in the ensuing months, Council certified 10 more majors. By the end of Fall 2009, 28 of the 38 programs originally invited to submit applications had been certified as Capstone Majors. The certification process and timeline for each major is posted in an online chart[9] that is maintained by the Workgroup in collaboration with Undergraduate Council.

Table 2 lists the inaugural Capstone Majors, 28 of which are now certified. Applications from eight more are still in various stages of review. The final two have opted to postpone submitting capstone applications until issues raised during their recent program reviews can be satisfactorily resolved.

Table 2. UCLA's Inaugural Capstone Majors*

Departments or IDPs (Interdepartmental Programs)	36 Capstone Majors	2007-08 Degrees^	Brief Description of Capstone
Art	*Art*	56	Studio project
Bioengineering	*Bioengineering*	27	Product design courses with paper
Chemical & Biomolecular Engineering	*Chemical Engineering*	47	Product design courses with paper
Civil & Environmental Engineering	*Civil Engineering*	44	Product design courses with paper
Computer Science	*Computer Science*	52	Both majors: Product design courses with paper
	Computer Science & Eng	41	
Classics	*Classical Civilization*	13	All four majors: Seminar with paper
	Greek	0	
	Latin	6	
	Greek and Latin	2	
Earth and Space Sciences	*Geology*	5	Both majors: Field research with paper
	Geol/Engineering Geol.	6	
Ecology & Evolutionary Biology	*Ecol., Behavior, & Evol.*	17	Both majors: Field research with paper
	Marine Biology	22	
Economics	*Economics/International Area Studies*	34	Directed individual research with paper
Electrical Engineering	*Electrical Engineering*	107	Product design courses with paper
English	*English*	405	Both majors: Seminar with paper
	American Lit. & Culture	62	
Institute of the Environment	*Environmental Science*	6	Environmental team project with paper
Ethnomusicology	*Ethnomusicology*	16	Performance, composition, or research project
European Studies IDP	*European Studies*	16	Advanced seminar with paper or directed individual research with paper
Film, Television & Digital Media	*Film and Television*	33	Senior thesis project
Global Studies IDP	*Global Studies*	50	Senior seminar with thesis
History	*History*	613	Seminar with paper
Math/Atmospheric Sciences IDP	*Math/Atmospheric & Oceanic Science*	0	Directed individual research with paper
Materials Science & Eng.	*Materials Engineering*	15	Product design courses with paper
Mechanical & Aerospace Engineering	*Aerospace Engineering*	36	Both majors: Product design courses with paper
	Mechanical Engineering	90	
Music	*Music*	38	Senior recital or composition
Musicology	*Music History*	17	Seminar with paper
Neuroscience IDP	*Neuroscience*	95	Paper or advanced research lab
Psychology	*Cognitive Science*	22	Internship with paper or research apprenticeship with paper
Southeast Asian Studies IDP	*Southeast Asian Studies*	3	Advanced seminar with paper
Spanish and Portuguese	*Spanish and Community and Culture*	3	Civic project with paper
Statistics	*Statistics*	8	Consulting project with report
Theater	*Theater*	58	Varies by concentration area: performance, direction, or presentation of creative works
Degrees awarded in 2007-08 to students in these majors:		**2,065**	**27% of 7,536 degrees awarded in 2007-08^^**

* The Undergraduate Council is expected to review the capstone applications of the highlighted majors in 2009-10.

^ Number of 2007-08 bachelor's degrees awarded.

^^ A total of 7,536 degrees were awarded to 7,083 graduating seniors; 453 seniors graduated with double majors.

As noted in Table 2, the inaugural Capstone Majors awarded 2,065 degrees to graduating seniors in 2007-08, representing 27% of the total baccalaureate degrees awarded that year. As demonstrated by the brief capstone descriptions in the table, most of the inaugural Capstone Majors require students to complete seminars or project courses. Some are offered in one quarter; others span two, or even three, quarters. Some capstone experiences take students to the field to conduct research (Marine Biology) or into the community for a civic project (Spanish and Community and Culture major in the Spanish & Portuguese Department). Students in Statistics work in small groups to solve problems posed by community- or campus-based clients. Art, Music, and Ethnomusicology require (or include as one option) that students perform or show creative works. Music majors with a composition concentration, for example, must program a set of their original compositions, assemble the performers, and perform in recital.

The inaugural Capstone Majors listed in Table 2 illustrate that capstone experiences are common for students in the UCLA Professional Schools that offer baccalaureate degrees. Of the 18 degree-granting programs sponsored by these units, 15 (or 83%) have a capstone requirement. In these Schools, which educate engineers, musicians, artists, and those pursuing careers in theater and film, undergraduates are typically required to complete a project (e.g., product design, film, composition, art portfolio) that demonstrates mastery and creativity. In two Schools (Engineering; Theater, Film and Television), students in all majors are required to complete a capstone.

Capstone requirements are also relatively common in the two UCLA institutes that offer undergraduate programs: the International Institute and the Institute of the Environment. Of the eight majors offered by these institutes, five (or 63%) are Capstone Majors. Students focus on interdisciplinary studies and often are expected to engage in capstone experiences that integrate materials at an advanced undergraduate level. This typically occurs in a senior seminar or as part of a research experience.

In the College of Letters and Science, capstone requirements for graduation are comparatively less common. The College supports 106 degree-granting programs; to date, only 13 (or 12%) are certified (or pending certification) as Capstone Majors. These majors represent all four divisions and encompass degree-granting programs that have only a handful of graduating seniors (e.g., Geology or Statistics), as well as two of the most popular programs: History with over 600 graduating seniors each year, and English (application pending) with over 400 graduating seniors. Some departments (e.g. Classics) offer several majors, all of which have the same capstone requirement. More commonly, there is a mix of capstone and non-capstone majors within departments that offer more than one undergraduate major. In large departments that offer multiple majors, such as Psychology, it is typically the smaller majors that require capstones. For example, within Psychology, Capstone Major certification is pending for Cognitive Science, while General Psychology (one of the largest majors in the College) and Psychobiology have not applied.

Most programs in the inaugural group of Capstone Majors specify the same capstone experience for all students completing a degree (or specific concentration in the degree). A few offer students a choice; for example, in the Neuroscience IDP, students choose between conducting independent research in a faculty laboratory and completing an advanced laboratory course. Neuroscience fits the UCLA Capstone Model (Figure 1): about 60% of Neuroscience seniors complete the advanced lab course; 35% undertake a one- or two-quarter independent study (199); and 5% submit an honors thesis. As more units develop Capstone Majors or Capstone Programs (discussed in "Future Plans for UCLA's Capstone Initiative"), we expect most programs will not have a single course or experience for all students; rather, we anticipate that many will adopt practices similar to Neuroscience, where students are expected to select among different levels of capstone experiences.

Experiences in the College: Senior Survey

The College Senior Survey[10], administered each spring, explores students' views about their lives on campus, their studies, and their plans after graduation. In support of UCLA's Capstone Initiative, the 2008 version—which was completed by 4,555 seniors (about 60% of the graduating class within the College)—incorporated a set of questions concerning four types of courses that encourage students to integrate and apply their knowledge from prior coursework: senior seminars with comprehensive term papers, community or corporate internships, departmental honors theses, and independent study courses. In addition, the 2008 survey queried student participation in "other" unspecified types of synthesis/application coursework. Highlighted here are selected findings from those data, with more information available in the full report[11].

Among 2008 respondents, 45% indicated they had completed *at least one* special topics senior seminar, community or corporate internship, independent study, or departmental honors thesis. Senior seminars provided the most common opportunity for students to demonstrate their capacity to synthesize and apply previously acquired knowledge. Half or more of those who did not participate in such coursework indicated they "did not choose to" enroll; roughly 20-25% attributed their non-involvement to the fact that such an option was "not available."

Self-reported student engagement in *at least one* senior seminar, internship, independent study, or honors thesis ranged from 25% in the Physical Sciences to 57% in the Humanities. Apart from (or in addition to) the four types of capstone courses queried in the survey, some students completed other types of integrative coursework that required them to produce a paper, video, thesis, or similar final project. Examples include graduate seminars, fieldwork, and advanced laboratory courses, most of which (75%) occurred within the student's major. In all, nearly two-thirds of respondents reported engaging *either* in senior seminars, internships, independent study courses, honors thesis work, or some "other" type of similar experience (Table 3).

Table 3. Senior Survey Respondents from the Four College Divisions Reporting Completion of One or More Selected Course Experiences (N = 2007-08 College Senior Survey Respondents)

Participated in:	Humanities N=730	Social Sciences* N=2,380	Life Sciences N=1,042	Physical Sciences N=403	All N=4,555
Senior Seminar	48%	30%	14%	9%	27%
Community or Corporate Internship	10%	17%	10%	5%	13%
Independent Study	14%	14%	21%	15%	16%
Honors Thesis	8%	5%	5%	2%	5%
At least one of above	57%	48%	38%	25%	45%
At least one of above, *or* "other" similar capstone class**	**72%**	**65%**	**64%**	**52%**	**64%**

*Includes seniors in majors sponsored through the International Institute.

**See text for description of "other" classes.

Respondents were asked to assess their experiences according to six evaluative statements, which are quoted in Table 4. Irrespective of the type of coursework they engaged in, the vast majority agreed that the experience was an "outstanding" aspect of their UCLA education. More than 90% who completed a senior seminar, independent study, or honors thesis reported the experience provided them with "strong intellectual challenges" and helped them to "better understand concepts introduced in related courses." Similar percentages "strongly agreed" or "agreed" that, through these endeavors, they made "meaningful" contributions. More than 80% also indicated that they

were motivated to do a "superior" job in completing their capstone-related responsibilities. By comparison, students who completed an internship course tended to report lower levels of intellectual challenge and less motivation to do a "superior" job. This may be attributable to the greater variability in internships; some may have met the capstone criterion of providing a "creative, inquiry-based learning experience that deepens the student's knowledge and integration of the discipline" while other may not have.

Table 4. Student Perceptions of Selected Course Experiences Reported in 2008 College Senior Survey

Percentage of respondents who "strongly agreed" or "agreed" with the statement:	Senior Seminar	Com/Corp Internship	Independent Study	Honors Thesis
Experience helped me better understand concepts introduced in related courses.	93%	80%	92%	94%
Experience provided strong intellectual challenges.	94%	78%	91%	97%
I was motivated to do a superior job.	84%	75%	86%	88%
I made meaningful contributions.	91%	87%	91%	96%
Experience was an outstanding aspect of my undergraduate education.	85%	88%	88%	91%
Experience encouraged me to apply to graduate or professional school.	60%	60%	70%	73%

For many students, engagement in one or more of these course-based experiences also affected their future plans. At least 70% of respondents who had completed an independent study or honors thesis, and 60% of those who had completed a seminar or internship, said their experiences encouraged them to apply to a graduate or a professional school (Table 4).

Survey respondents also had the option to share thoughts about their experiences. Regardless of the type of course they had taken, most of those who chose to comment shared positive remarks. Most frequently, they highlighted the value of "hands on" experience in helping them to see things from new perspectives, gain a sense of "coherence" with respect to how the various strands of their earlier coursework were interrelated, and develop a clearer sense of their future academic or career aspirations. Students also commonly lauded the intellectual and personal growth they experienced, and expressed appreciation for the role their faculty mentors played in facilitating that development. Some also viewed these experiences as a "defining" aspect of their undergraduate education.

A minority of seniors (about 10%) expressed negative sentiments about their capstone experiences. In some cases, they felt the course(s) could have been better "organized" or they personally could have been better "prepared" to undertake such efforts. More prevalent, however, was a realization that the nature or intensity of the work required in these courses was not to their liking.

Taken together, survey findings indicate that sizable numbers of College students participate in some sort of meaningful capstone-like experience prior to completing their bachelor's degree. However, there is an apparent lack of clarity among students about the language used for these integrative academic endeavors. Also, students tend to identify a broader spectrum of experiences than those specified in the survey as providing meaningful opportunities for curricular integration, synthesis, and application. Finally, there tends to be a shared sentiment among participants that engaging in such coursework is a valuable, and often powerful, aspect of their academic experience. This insight reaffirms the Capstone Initiative's potential for enhancing undergraduate education.

Future Plans for UCLA's Capstone Initiative

As noted in the opening paragraphs of this essay, UCLA's Capstone Initiative aims to broaden substantially the availability of undergraduate capstone experiences by UCLA's centennial in 2019. Toward that end, the Capstone Workgroup, in collaboration with the Undergraduate Council, has completed two phases of the Initiative. Phase one focused on defining a broad-based capstone model. Phase two emphasized both developing a certification process and certifying an inaugural group of Capstones Majors. In Winter 2009, the Capstone Workgroup initiated phase three with the following objectives: 1) expand the Capstone Initiative by certifying more Capstone Majors and establishing Capstone Programs, as feasible; 2) brand the capstone experience by adopting common language for the *UCLA General Catalog* and campus websites; and 3) establish models for assessing learning outcomes related to capstone experiences.

Expanding the Capstone Initiative

Early in Spring 2009, the Workgroup developed a letter and survey questionnaire[12] for departments and programs that were not part of the inaugural capstone group. The materials, which were approved by the Undergraduate Council, requested chairs (or designates) to review the UCLA Capstone Model and provide a list of courses in their curricula that might meet the capstone criteria. They also were asked to indicate their interest in becoming a Capstone Major, establishing a Capstone Program, or exploring capstone opportunities. Respondents were also given an option of indicating that they were "not interested" in exploring capstone possibilities at this time.

The Workgroup and Council added the "Capstone Program" option as an alternative to the Capstone Major for academic programs whose faculty are favorable to the Capstone Initiative but are not ready to set a requirement. Faculty in these programs are encouraged to review their course offerings and provide annual capstone options for at least 60% of their majors.

The 2009 Capstone Survey was sent to representatives of 87 majors offered by 11 interdepartmental programs and 40 departments. By late Spring 2009, responses from all 87 had been received. A chart[13] detailing these responses is available online and summarized in Table 5.

Table 5. Summary of 2009 Capstone Survey Responses by Academic Unit

Academic Units	Number of programs surveyed	*Interested in becoming a Capstone Major*	*Interested in establishing a Capstone Program*	*Interested in exploring capstone opportunities*	*Not interested now*	Total survey returns
Arts and Architecture	**3**	1	1	-	1	**3**
Honors "Individual Major"	**1**	1	-	-	-	**1**
Humanities	**39**	3	2	33	1	**39**
International Institute	**3**	-	1	2	-	**3**
Life Sciences	**7**	3	1	3	-	**7**
Nursing	**1**	-	-	1	-	**1**
Physical Sciences	**19**	4	2	8	5	**19**
Social Sciences	**14**	3	2	7	2	**14**
Total Number	**87**	**15**	**9**	**54**	**9**	**87**
% Total Returns	**--**	**17%**	**10%**	**62%**	**10%**	**100%**
% of Undergraduate Degrees Awarded in 2007-08 by these Units		**6%**	**5%**	**47%**	**11%**	**70%**

Survey findings reveal interest across disciplines in establishing capstone opportunities for undergraduate students. A total of 24 degree-granting programs expressed immediate interest in becoming a Capstone Major or establishing a Capstone Program and, based on follow-up conversations, 12 opted to initiate the certification process as soon as possible. In general, students in many of these majors were already required to complete coursework consistent with UCLA's capstone criteria. A few, in fact, expressed surprise that they had not been included in the inaugural group of majors considered for capstone status. Table 6 lists these 12 majors along with a brief description of the proposed capstone options.

Table 6. Majors Ready to Apply for Certification as a Capstone Major or a Capstone Program

Bachelor's Degrees	Interest	Proposed Capstone Experience
Atmospheric, Oceanic, & Environmental Sciences	Capstone Program	Advanced elective course, i.e. 186
Chemistry/Materials Science^	Capstone Major	Advanced lab with projects (C185)
Chicana and Chicano Studies	Capstone Program	Adv. seminar or individual project
College Honors: Individual Major	Capstone Major	Honors Thesis
Computational and Systems Biology^	Capstone Major	Capstone course sequence: 186A-C
Earth and Space Sciences (4 majors): Geology/Applied Geophysics	Capstone Major	Course sequence 136A-C
Geophysics/Applied Geophysics & Space Physics	Capstone Major	Course sequence 136A-C
Geology/Paleobiology	Capstone Major	Course sequence 136 A-C
Earth and Environmental Science	Capstone Program	Courses 111 and 121; 199 and 198
Physiological Science	Capstone Program	Seminar or Individual Research
Study of Religion^	Capstone Major	Course 100 with 25-30 pg biography
Women's Studies	Capstone Major	Senior Research Seminar: 187

^Degree programs offered by Interdepartmental Programs (IDP).

During the Summer and Fall of 2009, the Workgroup chair and staff met with representatives of all these units. Most are preparing applications for review in 2009-10; a few indicated a desire to apply at a later time. Faculty from an additional unit, Nursing—which had previously indicated only an interest in "exploring" capstone opportunities (per Table 5)—decided to apply, and the Nursing application was among the first submitted to the Workgroup in Fall 2009.

Excerpts from survey respondents indicating an immediate interest in submitting a capstone application demonstrate the range of opportunities currently available in these programs:

> *The Materials Chemistry Lab (C185) draws on knowledge gained across a broad range of chemistry and material science classes. While students do not design new experiments from scratch, many are somewhat open ended and the students must employ a good measure of experimental design in their measurements. If C185 counts* [as a capstone], *we* [Chemistry/Materials Science] *are already a capstone major.*
>
> *Religion 100 - Spiritual Autobiography and Biography is a required capstone course for the Study of Religion Major. This seminar draws on all the courses that have been taken by* [students] *and requires* [them to] *interview a person from a religion not their own in at least three sessions for a total of 5-6 hours…*[then write] *a 25-30 page spiritual biography.*
>
> [Geology/Applied Geophysics] *students are required to take the 136ABC sequence which provides intensive hands-on training of geophysical instrumentation (seismic, electromagnetics, etc.) and analysis tools (Fourier analysis, inversion, etc.) in 136AB and then 136C is a week-long field trip to use the tools in the field to address a "real world" problem. The most recent courses spent time in Peru, Mexico, and Mt. Etna in Sicily. The students produce tangible products from their research and many have presented their results at professional meetings.*

Currently, the Capstone Workgroup is following up with the 12 other programs that indicated an interest in becoming a Capstone Major or establishing a Capstone Program (per Table 7); some plan to prepare applications as early as 2010. In responding to the survey, representatives from these programs noted their current coursework could probably be adapted for capstone certification and were interested in making modifications. Others expressed strong interest in capstone opportunities for their students but indicated a need for more resources to offer all students advanced labs or seminars with capstone experiences. Two programs specifically supported the idea of the Capstone Program (as opposed to Capstone Major) option as their faculty endorsed the concept but, given their curriculum, may not be able to establish a *required* capstone experience.

Table 7. Majors Indicating Interest in Becoming a Capstone Major or Establishing a Capstone Program in the Near Future

Interested in Becoming a Capstone Major	Interested in Establishing a Capstone Program
Arts and Architecture: Individual Major	Comparative Literature
Art History	Design|Media Arts
Asian American Studies	East Asian Studies^
Hebrew	Geography (2 majors): Geography and Geography/Environmental Studies
Microbiology, Immunology, and Molecular Genetics	
Molecular, Cell, and Developmental Biology	German

^Degree program offered by an Interdepartmental Program (IDP).

A total of 54 programs (62% of 87 majors surveyed) expressed interest in the Capstone Initiative but wanted "more information" before pursuing certification (see Table 5). In responding to the survey, most listed possible capstone courses that their programs offered currently. These programs can be divided into three groups related to the general tenor of their responses (described below). In Fall 2009, the Workgroup chair and staff began following up with faculty from these 54 programs, prioritizing those in the first and second groups described below. These communication and facilitation efforts will continue throughout this year and beyond.

The first group (17 programs) has existing curricular options that could be developed into capstone experiences for most or all of their majors. They are in various stages of discussing how to expand these options and/or incorporate new coursework elements. Included in this group are programs in Anthropology, Asian Languages and Cultures, Italian, and Physics & Astronomy.

Programs in the second group (29) are considering how to adapt their existing curricula to increase participation. Their challenges in satisfying certification criteria are greater than those in the set above. For example, the Department of Linguistics (which offers 11 majors) has existing capstone opportunities for all of their students but participation varies widely based on course of study, student preparedness, and curricular requirements. The Biology major in Ecology and Evolutionary Biology faces challenges (given the large size of the major) that it must address to engage substantial numbers of students.

The remaining programs (8) expressed interest in exploring capstone possibilities and have existing curricular opportunities but reported planning constraints given available resources. Many in this group, which includes Chemistry and Biochemistry, Philosophy, Political Science, and Sociology, have ideas for how to broaden participation. However, factors such as high enrollment relative to faculty, existing curricular requirements that leave little flexibility, and the expense of providing needed equipment create considerable challenges to supporting significant participation.

Only nine of 87 majors surveyed indicated that they are "not interested now" in exploring capstone possibilities. The Department of Mathematics with five majors led the list, which also included Economics and Business Economics. These departments offered no comments, but brief follow-up conversations indicated that departmental representatives responsible for completing the survey thought their programs were simply too large to provide capstone options. Representatives from the remaining two majors, Arabic and Architecture and Urban Design, noted that students lacked either the language competence or the curricular space for a capstone project.

The unprecedented fiscal crisis now facing UCLA (reviewed in *Essay A*) will be a significant factor in strategic planning for the Capstone Initiative. All academic programs are being carefully re-examined and some will be pared down. In a summer memo[14], Executive Vice Chancellor and Provost Scott Waugh charged departments to:

> *Limit and re-examine the number of units required for majors. Many majors have grown through the gradual addition of courses over time, rather than through serious consideration of what should be required of students. As a result, many programs demand too many units of their majors, many more courses than can be practically offered in the present environment. The College's "Challenge 45" (reducing upper-division requirements for the major to 45 units) is one step toward streamlining... .*

As departments evaluate the curriculum for each degree program, they must identify courses that are core to the major, and examine students' progression to some end point or culmination. As a result, departments may require fewer courses; they also may engage in renewed discussions of what is expected of students and how to measure whether students have achieved these "learning outcomes." In a sense, crisis may become opportunity as the faculty envisions a reduced, but better-shaped, curriculum that, in some cases, may be strengthened by incorporating capstones.

In 2010-11, the Workgroup also will begin working with program faculty to address possibilities for establishing Capstone Minors. About 35% of UCLA students graduate with a declared minor, now available in 76 fields. Some are offered through departments and professional schools, while others are freestanding interdepartmental minors. Many, such as Biomedical Research, Civic Engagement, Disability Studies, Museum Studies, and Urban & Regional Studies, require capstone seminars or research projects. Students whose majors do not offer capstone experiences may find opportunities in their minors.

As reflected earlier in this essay, a cadre of UCLA faculty and staff across diverse academic disciplines has worked to define different types of capstone experiences that they believe serve to enrich undergraduate education. These individuals are a significant resource to other colleagues who are interested in considering the capstone potential within their degree programs. Based on the interest expressed to date, we anticipate that a majority of our undergraduate degree-granting program faculty will engage over the next five years in discussions about capstone possibilities.

In undertaking this work, UCLA recognizes that complex resource, curricular, pedagogical, and other challenges may preclude some programs from implementing capstones. Others simply may decide not to participate. The Capstone Initiative is *not* intended as a directive to program faculty. Rather, it is an effort to enhance, as feasible, UCLA's already outstanding undergraduate programs in potentially new and innovative ways.

Branding UCLA's Capstone Experience

Communicating to students, faculty, and others about UCLA's Capstone Initiative requires thoughtful changes in the manner in which we describe course and major requirements, as well as

the ways in which we promote undergraduate education to prospective students and their parents. Currently, we envision changes in the following: 1) course syllabi and evaluation; 2) *General Catalog* and department website information; and 3) advising materials for students.

Course Syllabi and Evaluations. Courses that satisfy a department's capstone requirement will be identified by the course title and/or in the course description. Each time a capstone course is offered, the faculty will note that the class meets the department's capstone requirement. In addition, the faculty will discuss and post the learning outcomes (in the syllabus or course website). Over the next few years, student evaluations of capstone courses will be redesigned to ask students to rate their experiences and achievement related to key learning outcomes (discussed in *Essay B*). Faculty in engineering have already added items about learning outcomes in their course evaluations, and they will serve as mentors to others in implementing this practice campuswide.

General Catalog and Departmental Websites. Capstone Majors and Capstone Programs will be identified in the *UCLA General Catalog*. In addition, learning outcomes for capstone experiences will be included. For the Department of History, as an example, a paragraph will be added to the 2010-11 catalog under the heading of "Undergraduate Study":

> *History is a Capstone Major; each undergraduate student must take a capstone seminar and demonstrate appropriate mastery of a specialized area of history and a critical understanding of current scholarly literature and debates, as well as design and complete a research project, drawing on primary sources and appropriate scholarly literature.*

In addition to the new catalog copy for the Department of History, two additional samples[15] are posted for review, one for the Department of Classics and one for the Department of Electrical Engineering. These samples demonstrate how UCLA will publicize capstone opportunities and learning outcomes associated with these experiences.

Departments with a Capstone Major or Capstone Program will also be encouraged to post learning outcomes on their websites for undergraduate students. For example, Electrical Engineering[16] has posted its learning outcomes for the undergraduate program and specific undergraduate courses.

Advising Materials for Students. Student advising materials will clearly identify the capstone requirement. Musicology, for example, has posted a check sheet[17] for majors, which outlines the capstone requirement for Music History majors. In addition, the orientation handbook will include examples of capstones, as well as an explanation of learning outcomes associated with these experiences. Materials provided by the admissions office will also give coverage to UCLA's Capstone Initiative and identify majors that provide these opportunities.

Assessing Capstone Learning Outcomes

As noted in *Essay B* of this report, departments with Capstone Majors have been asked to articulate learning outcomes for students based on their capstone requirements, and a listing of learning outcomes for each Capstone Major is presented in Exhibit 7.1A[18] of Appendix 5. Additionally, each department will periodically assess students' success (or lack thereof) in achieving the learning outcomes. In accordance with the new guidelines and timetable now set for UCLA's Academic Senate Program Reviews, faculty will be asked to provide a summary of these periodic assessments in the self-review report prepared for the program review (see *Essay B*).

The nature of learning outcome assessments will be determined by the faculty who, in designing and piloting their assessment tools and protocols, will be assisted by assessment staff from units in the Division of Undergraduate Education. Additionally, we will engage faculty who have previous experience assessing learning outcomes (e.g., those in Engineering for ABET accreditation).

Key to the assessment effort for most Capstone Majors will be evaluating students' culminating products (seminar papers, design projects, performances, etc.) from capstone experiences. In Marine Biology, for example, the capstone experience entails conducting field research in small teams and writing a research paper. Learning outcomes, which program faculty established as part of their capstone application, are listed in Table 8, along with possible assessment strategies, which the faculty is discussing this year (2009-10).

Table 8. Learning Outcomes and Possible Assessment Strategies for the Marine Biology Capstone

Learning Outcomes	Possible Assessment Strategies
• Demonstrate broad-based knowledge of the fundamentals acquired through coursework, including general knowledge and developing skills in library research, interpreting data, synthesis, and scientific writing. • Utilize the current primary scientific literature, including searching databases, identifying appropriate sources, and reading and understanding papers. • Use knowledge gained in classroom and during discussions to conceive and execute their own project. • Communicate original scientific work to colleagues and mentors in oral and written form. • Exhibit strong teamwork and problem solving skills.	• Archive term papers, sampling a range of papers from A (best in class) to C (average) or below. Have faculty panel judge the students' levels of scientific writing and abilities to interpret data. If students exhibit recurring problems, determine how the field course or courses taken before the field quarter need to be modified to better prepare students for the capstone experience. • Use the department's spring science poster event to award prizes for the best field research and review these students' oral and written performance; publish excellent papers as 'best examples' for faculty and students.

According to the Academic Senate's Program Review schedule, Marine Biology is next scheduled for review in 2014-15. As part of the self-review report, the faculty will be asked to: 1) articulate learning outcomes for the capstone experience, 2) summarize their effort to assess the extent to which students have achieved these outcomes, and 3) discuss changes (if any) implemented as a result of their evaluation.

Summary

UCLA attracts some of the best students in the state and nation. In the interest of enhancing their development as scholars and providing them with opportunities to demonstrate their knowledge and skills creatively, we have embraced a bold initiative that holds the potential for transforming the UCLA undergraduate experience. Our long-term goal for the Capstone Initiative is to broaden substantially the availability of undergraduate capstone experiences by UCLA's centennial in 2019, which coincides with the next WASC reaccreditation.

In the past two years, UCLA has made substantial progress toward this goal by: 1) establishing criteria for UCLA capstone experiences; 2) creating a certification process for Capstone Majors and Programs; 3) certifying an inaugural cohort of Capstone Majors and Programs; 4) initiating a process for helping Capstone Major and Capstone Program establish learning outcomes assessment plans; and 5) responding to departmental interest in the Capstone Initiative.

Clearly, the unfolding financial crisis presents a defining moment for our academic community, a time when we are faced with both extreme challenge and tremendous opportunity, and when the choices we make about what to preserve and promote will have an indelible impact on the university we become. This is an occasion that calls us to reconsider the core elements of UCLA's undergraduate education, to engage in new dialogue about learning and teaching, and to reflect on how our existing curricula, pedagogical practices, and policies serve to enhance educational effectiveness. As we prepare for these challenges, the Capstone Initiative holds potentially great promise for anchoring academic programs that are streamlined, cohesive, and integrative.