# *Essay 7. Facilitating Interdisciplinary Education and Research*

### *Introduction*

Many of the most dynamic frontiers of knowledge are at the boundaries of traditional academic disciplines. UCLA, with its broad portfolio of multi- and interdisciplinary education, research, and service programs, is at the forefront of these new areas of scholarship. The wide range and strength of programs in the professional schools and the College, along with the physical proximity of these units, have enabled new bridges to form between disciplines and new disciplines to be created at the intersections of existing ones. Cutting-edge interdisciplinary programs have become central to UCLA's ability to recruit the best students and faculty and attract public and private support. The university aims to consolidate and extend its strengths in interdisciplinary education and research by reducing obstacles to participation and creating new mechanisms that support these vital activities.

We begin this essay by describing and comparing the types of units through which interdisciplinary education and research are conducted at UCLA. Examples of formal instructional programs and research units are then provided to illustrate both the merits and weaknesses of these structures. This analysis provides the basis for determining how existing structures can be improved, and for envisioning new mechanisms that will enable us to take better advantage of existing strengths and respond more rapidly to emerging opportunities. Finally, we propose two case studies for the WASC *Educational Effectiveness Review*. Analysis of these cases will help us identify and focus on the policy and procedural reforms that can best support interdisciplinary activities on campus.

For the purpose of this essay, "interdisciplinary" education and research are defined as efforts that span two or more departments or schools. Although the distinctions between this and related terms is debatable, this definition captures, in a simple way, a wide range of cross- and multi-disciplinary activities, as well as nascent disciplines at the intersections of established ones. This definition is expansive enough to include collaborations driven by the scholarly interests of the faculty, as well as by external stimuli including extramural funding opportunities.

The table below summarizes UCLA's five categories of interdisciplinary units. Four of these—Interdepartmental Degree Programs (IDPs), Centers for Interdisciplinary Instruction (CIIs), Organized Research Units (ORUs), and Multi-campus Research Units (MRUs)—are formal units described by Academic Senate Regulations and reviewed periodically by the Academic Senate's Council on Research. All may receive faculty FTE allocations but only CIIs can make full appointments. The fifth category encompasses the broadest array of centers and institutes, totaling over 100 across campus.

**Summary of Interdisciplinary Units at UCLA for Instruction and Research**

| | Approved by | UC Review | Allocated FTE | FTE in unit |
|---|---|---|---|---|
| Interdepartmental Degree Program<br>List of 41 IDPs [1] | Academic Senate and EVC | Academic Senate → EVC | Yes | Only partial |
| Center for Interdisciplinary Instruction<br>List of 3 CIIs [2] | Academic Senate and EVC | Academic Senate → EVC | Yes | Yes |
| Organized Research Unit<br>List of 23 ORUs [3] | Academic Senate, VCR and UCOP | Academic Senate → VCR and UCOP | Yes | No |
| Multi-Campus Research Unit<br>List of 8 MRUs [4] | UCOP | Academic Senate → VCR→UCOP | Yes | Only partial |
| Other Research Centers & Institutes<br>List of over 100 campus units [5] | Campus administration | None | Rarely | No |

UCOP = University of California Office of the President; VCR = Vice Chancellor for Research; EVC = Executive Vice Chancellor

***Interdisciplinary Education: Opportunities and Challenges***

UCLA has a long and rich history of delivering interdisciplinary instruction. The Interdepartmental Degree Program (IDP), initiated in the 1960s, is the most common unit offering degree programs focused on subject matter not encompassed by existing departments. Our 41 IDPs offer 61 degree programs: 19 minors, 17 majors, 13 masters, and 12 doctoral degrees. The Chair and Faculty Advisory Committee of each IDP are appointed annually, either by the Faculty Executive Committee (undergraduate IDPs) or Graduate Council (graduate IDPs). Each IDP undergoes a periodic Academic Program Review (*Essay 2*) and reports to a dean. While a few IDPs are joint programs between two units (e.g., Mathematics/Economics), most are broad in scope. Many of those have been allocated a few permanent faculty FTE; they use these positions, as well as temporary faculty funds for teaching buy-outs, to ensure that an appropriate number of courses are offered each year.

Women's Studies[6] exemplifies a complex IDP. The program offers a B.A. (approved in 1981) and a Ph.D. (1999) and is affiliated with the Center for the Study of Women[7]. The IDP was initially allocated faculty FTE, which were fully appointed in allied departments; later, faculty were permitted to hold split appointments (up to 50%) in the IDP. By 2006, Women's Studies had four faculty members with split appointments and 35 affiliated faculty members (with no appointment) from 20 different departments. Problems related to the lack of a core faculty—including ongoing negotiations with allied departments to secure needed teaching—led the Faculty Advisory Committee to propose establishing a Women's Studies department. If approved, this action will be the sixth IDP departmentalization[8] since 1990. IDPs seek departmentalization because they perceive it as the only way of securing a core faculty and as the means of authenticating a new field with strong interdisciplinary roots. Some of these actions, however, have led to the formation of departments with non-traditional faculty units dominated by split appointments and, in some cases, to a reduction in interdisciplinary outreach, as newly formed departments began to draw their own borders.

A Center for Interdisciplinary Instruction (CII) is UCLA's other unit for interdisciplinary teaching. UCLA currently has only one CII, the instructional unit of the Institute of the Environment (IoE[9]), which also functions as a center for research. Another CII is currently being proposed that is similar to the IoE; see Next Steps. As a CII, the IoE established a minor in Environmental Systems and Society, and five years later proposed an innovative "dual-component" program for a B.S. in Environmental Science[10]. For the first component, students complete a set of required IoE-sponsored courses designed to introduce them to environmental issues from a broad interdisciplinary perspective. For the second, each student selects courses from a specialized field that fulfills the requirements for a minor controlled by a partner department (e.g., Minor in Earth and Space Sciences). This dual-component program challenged faculty to consider a new model for undergraduate education, in which students complete a major and a minor within a single curriculum. The proposal was debated by Senate agencies and re-drafted for a period of two years before it was finally approved.

A 1997 Multidisciplinary Studies Taskforce debated the continued need for CIIs and cautioned that any petitioner proposing to establish a CII should be required to "affirmatively justify why either IDP or departmental status is not a more appropriate outcome," but offered no guidelines. As asserted in the 1997 taskforce report[11] and then codified in 1998 by a policy directive[12] from (then) Interim EVC Norman Abrams, a CII is expected to have core faculty with full (100%) but joint or split appointments are expected to be the primary form of ladder faculty appointments. A CII has responsibilities for academic personnel actions, and faculty in the unit are represented on a Faculty Executive Committee and in the Legislative Assembly. An Academic Senate Taskforce recently addressed issues that challenge IDPs; it was the fourth group appointed since 1990 to review interdisciplinary instruction. Their 2007 report[13] recommends a new method for appointing IDP Chairs and advisory committees. It also argues that IDPs should be permitted to make full appointments and be required to have a core faculty, criteria that heretofore have been associated with CIIs.

### *Interdisciplinary Research: Opportunities and Challenges*

Research centers and institutes provide UCLA faculty with a wide array of opportunities to pursue scholarly work and address broad societal questions from interdisciplinary perspectives. While teaching obligations for most faculty members are grounded in their departments, research is not. The nearly 100 research centers and institutes that have been established in recent years nucleated around the research interests of groups of faculty, often nurtured by seed support from the Chancellor or deans. These research units are found in all sectors of the campus, and the majority are not constituted as ORUs. Some, such as the Center for Medieval and Renaissance Studies[14], Center for the Study of Race, Ethnicity, and Politics[15], and Burkle Center for International Relations[16], bring together artists, humanists, and social scientists in cross-cultural studies. Other research centers, including the Institute for Pure and Applied Mathematics[17], the UCLA/UCSB California NanoSystems Institute[18], and the Jonsson Comprehensive Cancer Center[19], bring engineers and mathematicians together with scientists from all fields. Centers or institutes such as the IoE, Center for Society and Genetics[20], and the Cotsen Institute of Archaeology[21] engage participants from across the campus, connecting scientists with humanists; socio-economists with clinicians; musicians with mathematicians; artists with engineers; and legal scholars with educators, bringing multidisciplinary perspectives to bear on complex problems and issues. These centers provide a vital touchstone for UCLA's excellence.

At UCLA, the distinction between non-ORUs and ORUs may no longer be useful. As originally conceived in the UC system, ORUs provided a mechanism through which new money and FTEs could be obtained from the State to promote research in emerging new areas uniting different disciplines. Many ORUs were established in the 1960s and 1970s, when interdisciplinary efforts were nascent. Some of these older ORUs span fields in which departments, IDPs and non-ORU research centers now play similar functions. The Molecular Biology Institute (MBI[22]), for example, was established in 1963; at that time it was the principal campus promoter of molecular biology research and education through its core facilities in Boyer Hall and its allied interdepartmental doctoral program. Now, because molecular biology is represented in many departments, MBI's mission is no longer sharply defined and its efforts increasingly overlap those of departments. Similarly, the Brain Research Institute (BRI[23]), established in 1959, was once the main sponsor of neuroscience with its core facilities and interdepartmental doctoral IDP. Nearly 50 years later, neuroscience is a well-established field with faculty and academic concentrations in dozens of units in the College, as well as units in medicine and engineering.

The MBI and BRI maintain important consortium functions, but their mega-size can prevent nimble responses that are typical of smaller, more focused research centers. Multi-campus Research Units (MRUs) share this problem. MRUs link UC faculty among participating campuses and contribute to statewide research efforts. The Institute for Geophysics and Planetary Physics[24], established by the Legislature 61 years ago, is one of 8 MRUs that involve UCLA faculty. According to a 1999 report[25], MRU funding was meant to amplify extramural support, but no new UC funds have been allocated to these units for many years. In 2006, a UC-wide Senate-Administration joint workgroup made recommendations[26] for reinvigorating MRUs, focusing on maintaining excellence by increasing responsiveness to emerging opportunities. Their recommendations include an updated MRU taxonomy[27], a new 5-year funding limit, a tax on existing MRUs to generate seed funds for new programs, and a decrease in centrally UC funded faculty FTE (held by MRUs) over the next five years. Implementing these changes will be challenging for several campuses, including UCLA.

### *Next Steps: Facilitating Interdisciplinarity and Educational Effectiveness*

The UCLA faculty and administration are committed to lowering barriers to faculty participation in interdisciplinary education and research, and to creating a porous, flexible environment that facilitates the flow of ideas, people, and resources across boundaries. A significant challenge is the perception

that interdisciplinary programs compete with departments and discipline-based research centers for resources, a common problem cited in the 2004 National Academy of Sciences report, *Facilitating Interdisciplinary Research*[28]. Administrative barriers between divisions and schools add to the difficulty of incorporating interdisciplinarity into the curriculum. Our goal is to make academic departments, which are often perceived as silos, more open, so that new scaffolds can form and evolve to support new scholarship areas. For our *Educational Effectiveness Review*, we have identified two projects that we will use as case studies to help us assess the policy and procedural reforms that can best advance interdisciplinary activities. These case studies encompass education and research at the undergraduate and graduate levels, and involve interactions between the College and professional schools. They also highlight different kinds of challenges: the first focuses on barriers to launching a new campuswide undergraduate degree program, whereas the second addresses issues identified with existing doctoral training programs in a well-established interdisciplinary culture. Given the range of issues associated with these cases, we anticipate that addressing them will clarify our understanding of how best to support new interdisciplinary initiatives across the campus.

**Case Study 1.** Developing a new undergraduate program at the intersection of biology and society. The Center for Society and Genetics (mentioned above) recently submitted a proposal to create a new CII. The Center also plans to launch a new major that will challenge the way faculty envision undergraduate education. Since 2002-03, members of the center have organized and taught an innovative and challenging Freshman Cluster course on Biotechnology and Society[29], which explores the biological, ethical, and socio-political dimensions of biotechnology (also see *Essay 4*). Building on this experience, the proposed undergraduate major in *Biology and Society* will position human biology where the natural and social sciences intersect with the humanities. It will thus make explicit and open to reflection the ethical and social content of biology, as well as the biological content of social and cultural life. Broadening the study of biology to encompass its social dimensions, the major will focus on topics such as race, aging, and the evolving human-environment interface; it will also introduce students to the biological dimensions of subjects traditionally addressed in the humanities and social sciences, including race, family, ethics, and religion. By studying this curriculum-building project from its infancy, we will learn how to facilitate the creation of cutting-edge interdisciplinary programs. Developing this major in the course of the WASC review will encourage the articulation of educational objectives and student learning outcomes, as well as the formulation of plans to assess the educational effectiveness of this highly innovative interdisciplinary curriculum.

**Case Study 2**. Sustaining interdisciplinary graduate education and research training programs. At the graduate level, UCLA has been highly successful in obtaining federal funding for interdisciplinary education and research training programs[30], including a large number of NIH training grants and four NSF Integrated Graduate Education and Research Training (IGERT) programs, such as the Materials Creation Training Program[31] for doctoral students in chemistry, physics, and engineering; and the Bioinformatics Training Program[32] for students in chemistry, molecular biology, and computer science. These programs attract outstanding graduate students, enrich the curriculum and enhance our students' professional preparation, and some, such as the Bioinformatics training grant, have led or will lead to new IDPs at the doctoral level. Despite the advantages of these training programs, they present a number of challenges that we propose to address as part of the reaccreditation process. First, UCLA does not have mechanisms for initiating, selecting, and supporting graduate training programs based on institutional priorities. Internal competitions for limited submission programs and processes for securing institutional commitments (such as matching funds) are slow and opaque. Second, when external funding ends, UCLA has no mechanisms for: 1) determining which programs should be sustained; 2) continuing support for successful, high-priority efforts; or 3) weaving the program elements (curriculum, faculty and student affinity groups, infrastructure) into the institutional fabric. It may be appropriate to consider creating units that are more dynamic and flexible than ORUs, IDPs and CIIs, which can be difficult to establish and even more difficult to disestablish.