

# UC Merced

## AIARU: Executive Summary

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## **ACADEMIC INNOVATION AND THE AMERICAN RESEARCH UNIVERSITY**

**University of California, Merced  
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### **EXECUTIVE SUMMARY**

Research universities are complex, human organizations. They are charged with educating future generations as well as solving society's problems through the creation of new knowledge. As the first new American research university of the 21<sup>st</sup> century, the University of California, Merced is committed to maintaining the excellence in education and research that is the hallmark of the University of California.

In the fall of 2009, UC Merced hosted a Symposium of distinguished university leaders (see Appendix for a list of panel members) to discuss the future of the public research university. Faculty and administrators explored the future of undergraduate and graduate education, disciplinary versus multidisciplinary or interdisciplinary research and instruction, organizational structure, and general education in the research university in general and at UC Merced in particular.

Over the course of the panel presentations and the ensuing discussions, it became apparent that no single approach would fully satisfy the objectives and ideals of all participants. Nevertheless, a series of common themes became apparent:

- Undergraduate education was reaffirmed as a core mission of the research university. To that end, UC Merced should make efforts to ensure that its students continue to have strong and substantive research experiences as undergraduates. Additionally, all undergraduate courses should be continually infused with new knowledge created by the research of the faculty.
- Interdisciplinary and multidisciplinary research can provide solutions to many of society's current and future problems, but these research activities must be grounded in strong disciplinary cultures. To that end, core academic disciplines are needed at research universities to provide the academic foundations for much of the curriculum. These core disciplines also provide well-recognized academic homes for both students and faculty. Names do matter, and academic disciplines with conventionally recognized titles can be important for buy-in from students, their parents, the faculty, and the faculty's peers.

- The objectives of the research university can be met through a variety of different administrative structures. What is perhaps more important than any specific structure is agreement that the core missions of the research university include excellence in undergraduate education (including a strong general education program), excellence in graduate education, and a robust research program. The research effort must advance the frontiers of knowledge and, as appropriate, address the current and future problems of society. Once the faculty and the administration agree upon these core missions, they can work collectively to ensure that they are accomplished.

The American research university is a complex enterprise with multiple and often conflicting objectives, stakeholders, and missions. Addressing this complexity has always been a challenge, but the current economic environment and associated reductions in state funding make this a particularly challenging time to establish a new public research university. Nevertheless, it is in just such a climate that the University of California created its tenth campus, UC Merced, to meet the needs of California's growing population and to address issues pertinent to the Central Valley.

As a campus created from whole cloth, UC Merced has striven to develop structures, practices, and cultures that will allow it to take its place alongside its nine sister campuses as a doctoral research university. From its inception, UC Merced was viewed as the next great experiment in American higher education. It was envisioned as a university that would be organized without internal barriers, enabling the cross-fertilization of knowledge through interdisciplinary and multi-disciplinary research. Much of the research would focus on problems of the region, providing relevance to the surrounding population in particular and to the state as whole. It would be a student-centered research university emphasizing student success at all levels while attaining the status of a tier-1 research institution. Since opening in 2005, UC Merced has striven to attain this utopian goal, but it has faced numerous challenges along the way.

UC Merced was organized as a campus without discipline-oriented departments. Instead, the initial faculties were clustered within three schools: Natural Sciences, Engineering, and a combined school of Social Sciences, Humanities and Arts. The deans of each school have the responsibility to deliver undergraduate majors. Graduate programs reside under the auspices of a graduate dean and are either interdisciplinary or discipline focused. These initial structures allowed the university to begin undergraduate and graduate instruction with a limited number of ladder-rank faculty augmented by lecturers, but they have also created many tensions on campus. At times the campus has struggled to find the right balance between the needs of undergraduate and graduate education, between research and teaching, between disciplinary and multidisciplinary or interdisciplinary scholarship, and between the curricular demands of undergraduate majors and general education. These tensions exist at all research universities, but the UC Merced faculty have debated them continually throughout the institution's formative years.

The Symposium held at UC Merced was designed to discuss these topics and provide some thoughts on possible paths forward as the campus continues to grow and develop. This Symposium on Academic Innovation was broken into three panels, each of which focused on a separate topic. The first panel examined the connection between the research mission of the modern research university and the undergraduate teaching mission. The boundaries of disciplinary, interdisciplinary and multidisciplinary education and research were also discussed. The second panel explored the topic of academic structure from the perspective of faculty recruitment, development, and advancement. Which colleagues should evaluate the faculty member's performance? What local administrative structure would best serve the teaching and research missions of the faculty? The third panel discussed the role of general education in the public university.

The proceedings of the Symposium were captured on videodisk with an edited version available for dissemination. This executive summary strives to capture the most salient points from the Symposium and put them into local context.

## **UNDERGRADUATE EDUCATION AND THE RESEARCH UNIVERSITY**

The academic reputation of a research university rests largely on its research output. National rankings of graduate programs, Carnegie classifications, and membership in the prestigious AAU all depend on the size, scope, and excellence of a university's research enterprise. The reputations and advancement of individual faculty in research universities are based largely on the impact of their research. While the nature of scholarship varies with discipline, the impact of a professor's research program is often related to both the quality and size of the research effort.

Research in the STEM fields (science, technology, engineering and math) is often very labor intensive. Consequently, STEM faculty often have a cadre of graduate students and postdoctoral researchers who are generally funded on extramural grants. The typical STEM faculty member spends a significant amount of time writing grant proposals, managing grant budgets, writing project reports, and overseeing research personnel just to maintain this enterprise. All of this activity requires an extensive knowledge of existing literature on one or more subjects, and all research activities require careful data analysis and interpretation by the faculty. Faculty in other areas of scholarship, the social sciences, humanities, and arts often function more as individual investigators. Nevertheless, these scholars also spend considerable time studying existing literature, formulating new concepts, and expressing these through their writing. Faculty in some of these areas (i.e., the quantitative social sciences) also maintain large grant-funded research groups with the same expectations and demands on faculty time as their colleagues in the STEM fields.

Considering this significant expenditure of faculty time and effort in the name of research, one might well question the role of undergraduate education in the American research university. However, excellence in undergraduate education is possible and

can be the norm in research universities. In his book, *Academic Duty*, former Stanford University President Donald Kennedy writes,

*“Responsibility to students is at the very core of the university’s mission and of the faculty’s academic duty. In recent times, however, research and innovation have been assuming larger roles in the American university. This probably represents a transitional state, and will be followed by the gradual achievement of a new balance in which the university’s primary products are people, with technologies secondary, and in which research and scholarship are more tightly interwoven with our responsibilities for educating young men and women.”<sup>1</sup>*

As noted above, the academic culture of a research university places a high premium on research and scholarly inquiry. This may be at odds with how the majority of American society views universities as educational institutions which have as their primary mission the education of undergraduate students. Increasingly, this education is expected to relate to job skills and future employment. This is particularly true for land grant universities such as the University of California. How then does the university resolve this apparent conflict in missions, i.e., research versus undergraduate education?

In addressing this question, the first panel echoed the sentiments of Donald Kennedy, namely that research and scholarship be tightly interwoven with the university’s responsibility for educating young men and women. This is accomplished when faculty infuse new knowledge gleaned from their research projects into undergraduate courses. Because the pace of knowledge creation typically exceeds the time required to publish a university text, faculty who bring their research into the classroom are able to provide undergraduates with the most current thinking on a topic before it is available in a textbook. Additionally, faculty who are actively creating new knowledge through research and scholarship typically exhibit a high level of understanding and enthusiasm for the topic not found in other educators. Enthusiastic research faculty are thus often highly effective in instilling a sense of subject-matter appreciation in their classes.

The interweaving of research and scholarship with undergraduate education can also be achieved by the inclusion of undergraduates in the actual research enterprise of university. Providing significant undergraduate research experiences can and should be the hallmark of a research university. The act of creating new knowledge, of being the first to peer into the unknown and find a kernel of understanding that has escaped others produces a passion for learning and a comprehension of the topic not found in other forms of instruction. Indeed, research is, and must continue to be, at the core of undergraduate instruction in the research university.

The faculty at UC Merced have embraced the importance of providing research opportunities to undergraduates. Recent surveys indicate that over 60% of the undergraduates at Merced have significant research experiences during their time as

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<sup>1</sup> Donald Kennedy, *Academic Duty*, (Harvard University Press, 1997), 59.

students. Course syllabi and program learning outcomes for undergraduate majors indicate that faculty commonly incorporate the latest information in their courses and they expect this knowledge to be learned by their students. It will be a challenge, however, to maintain this practice as the university grows. Faculty must have sufficient time to work one-on-one with undergraduates in their research. This will only be possible if the institution maintains appropriate ratios of students to ladder-rank faculty.

A tight interweaving of research and undergraduate classroom instruction is only possible if the majority of undergraduate courses are taught by ladder-rank faculty, usually with the assistance of graduate students. The growing use of lecturers in the classroom will increase the distance between undergraduate students and the creation of knowledge.

Symposium speakers in the first panel also discussed the role of disciplinary, multidisciplinary, and interdisciplinary approaches to both research and instruction. Several speakers agreed that many of the problems faced by today's society reside in the spaces between disciplines and that teams of investigators with strong disciplinary skills should join forces to address these topics. What then is the role of the multidisciplinary and/or interdisciplinary scholar, and how do these topics relate to both undergraduate instruction and to faculty recruitment and advancement? Most of the Symposium speakers came to the conclusion that the best university instruction is discipline-based, leading to a strong grounding in the approaches and knowledge of a particular field. While this is clearly true for undergraduate majors, it is in many ways just as significant for graduate instruction. It is important that university students at all levels be educated in a recognized and clearly defined discipline. At the undergraduate level, such recognition is necessary for acceptance by students and their parents. It is equally important at the graduate level as future employers, particularly academic institutions, may be reluctant to hire doctoral recipients with degrees in multidisciplinary programs.

To some extent, multi-disciplinary and interdisciplinary research can pose significant challenges to faculty. While there is, indeed, a large body of interesting work in the spaces between disciplines, faculty advancement and career development normally hinges on evaluation by peers who come from well-defined disciplines. Typically, one garners this recognition by publishing through mainstream outlets that are read by one's peers. Often multi-disciplinary and interdisciplinary work is seen to be outside the mainstream and can be more difficult to evaluate. Thus, it is often given less credit than work done within a discipline. How then can a researcher address the intriguing and important problems that transcend the boundaries of a single discipline? Perhaps this is best accomplished by collaborating in multidisciplinary and interdisciplinary teams where faculty from different fields each bring their specific skills and methodologies to bear on a research problem or topic that can not be addressed by a single disciplinary approach. When done properly, such collaborations allow each of the investigators to publish their contributions in disciplinary outlets commonly used by their own community of scholars. This provides the collaborating researchers the opportunity for recognition within their home disciplines and expands the intellectual base of each of their fields.

## **ORGANIZATION AND STRUCTURE OF THE MODERN RESEARCH UNIVERSITY**

If the paradigm of discipline-based educational programs and disciplinary faculty remains the model for research universities, what is the optimal structure needed to achieve the goals of undergraduate and graduate instruction along with faculty recruitment and career advancement? The second panel of the Symposium addressed this question. Several models were proposed, including traditional academic departments, direct allocation of faculty lines to graduate groups (both disciplinary and interdisciplinary in nature), and direct allocation of faculty lines to research institutes. Many panel members also discussed higher levels of organizational structure within the university. Should schools or colleges be broad and all encompassing such as a College of Letters and Sciences, or should they be narrow in scope, exemplified by a School of Life Sciences or a School of Humanities? The panel did not reach consensus on this question and it was apparent that multiple models or structures could be used to achieve the same goals. What was clear is that due to the complexity of the research university, one organizational structure cannot satisfy all objectives for all disciplines. One might contend that a specific structure should be adopted to achieve a desired goal. For example, one could easily argue that organizing departments around undergraduate majors and allocating faculty lines to teach the courses in these majors is the best way to assure that undergraduate instruction is optimized. Conversely, one might argue that the needs of cross cutting graduate programs can only be adequately addressed if faculty lines are directly allocated to meet the needs of graduate instruction and that undergraduate instruction be covered as best as one can. Or, one could allocate faculty lines to research institutes to address specific research agendas, but then how can the institution be assured of meeting the educational needs of existing and future undergraduate and graduate programs? Clearly there are advantages and disadvantages to each of these structures. The agile institution is one that remains flexible, allowing the faculty to self-assemble in ways that best meet their multiple objectives.

The ability to deliver well-grounded, discipline-based undergraduate majors while simultaneously meeting the research needs of the faculty and the demands of graduate education requires the adoption of a shared set of institutional goals for all of these activities. Resource allocations must be based on this shared set of goals. In some instances, e.g., faculty lines, these allocations will happen primarily within existing and future schools at UC Merced. In other cases, councils of faculty and administrators will need to oversee the allocations of resources to activities that transcend the boundaries of a given school. Such is the case for some interdisciplinary graduate groups and research institutes. If those making resource allocations remain mindful of the institution's shared goals, then the faculty and the administration can be assured that UC Merced will fulfill its educational and research missions.

## **GENERAL EDUCATION AND THE RESEARCH UNIVERSITY**

From its early beginnings in 1639, undergraduate education in the United States has been based on the liberal arts model. In this context, liberal does not refer to a specific political leaning but rather to exposing students to a strong, well-rounded breadth of courses in the humanities, the sciences, and the arts. Traditionally, the purpose of a liberal arts education was not to convey specific job skills but rather to produce a “well educated individual.” However, society increasingly expects more specialized skills from graduates of its public universities. The professionalization of undergraduate majors in such fields as engineering, science, and business can be at odds with the goal of ensuring that all students receive a well-rounded education. Nevertheless, there is still a need to assure that UC graduates have the ability to write, to have quantitative skills, to analyze written material, to develop critical thinking, and to have some knowledge of the broad human condition. Typically, the persistent tension between the need for narrowly focused, specialized majors and a broader liberal arts education is addressed through the adoption of a general education curriculum. The latter is a set of courses and skills that all students are expected to master by graduation.

The third panel of the Academic Innovation Symposium explored the topic of general education within a research university. Multiple models were discussed, ranging from the University of Cambridge model where general education skills are infused through all courses to more “cafeteria-style” models in which students choose from a set of courses that encompass the faculty’s goals for general education. While no consensus was reached on the best model for general education, it was clear that all participants felt strongly that a robust general education program was an essential part of the education of all undergraduates. UC Merced faculty expressed a desire to continue with the existing model of general education, which is a blend of a traditional cafeteria approach with two core courses. In the first core course, all freshmen participate in a large lecture course that integrates knowledge from the fields of natural science, engineering, the social sciences, humanities, and the arts, to explore contemporary problems. This course also serves as one of the primary writing courses for all lower-division students. At the upper division level students assemble in teams comprised of peers from multiple disciplines across campus, once again to explore a contemporary problem, this time bringing the skills learned in their disciplinary courses. In this way, students experience the multidisciplinary environment common to both the public and private sectors of the external world while expanding the breadth of their own education. This upper division course has been logistically difficult to offer as the number of undergraduates has increased. However, UC Merced faculty are committed to finding a means to continue the course though it will remain an ongoing challenge as the campus grows over time.

## **CONCLUSIONS**

The modern research university is a complex institution striving to simultaneously meet its obligations to the education of undergraduates and graduate students and public service while conducting world-class research and scholarship. The public research



university must address the needs of a broad group of stakeholders, including students and their parents, industry, taxpayers, and the state and federal governments as well as its own faculty. Often these stakeholders have conflicting goals and interests. The successful institution will be one that is cognizant of all of these stakeholders while optimizing its educational offerings, academic structure, and faculty composition to meet their needs. There is no single model that is best suited to address all of these conflicting goals and interests. Rather, the successful research university will remain flexible, adopting a set of structures and developing a shared set of goals and objectives that are informed by all interested parties.

**APPENDIX: ACADEMIC INNOVATION AND THE AMERICAN RESEARCH UNIVERSITY SYMPOSIUM  
PANEL MEMBERS**

**INTRODUCTION: HISTORICAL OVERVIEW OF AMERICAN RESEARCH UNIVERSITIES**

**KANG, SUNG-MO “STEVE”** - CHANCELLOR, UC MERCED; PROFESSOR, SCHOOL OF ENGINEERING, UC MERCED

**Kantor, Shawn** - Symposium Moderator, Professor, School of Social Sciences, Humanities and Arts (Economics) and County Bank Endowed Chair in Economics, UC Merced

**Marcus, George M., Regent**, University of California

**Whalley, Alex** - Assistant Professor, School of Social Sciences, Humanities and Arts (Economics), UC Merced

**Yudof, Mark** - President, University of California

**PANEL ONE: UNDERGRADUATE EDUCATION AND THE RESEARCH UNIVERSITY**

**Banerjee, Prith** - Senior Vice President, Research and Director, Hewlett Packard Laboratories

**Björnsson, Hans** - Interim Dean, School of Social Sciences, Humanities and Arts, UC Merced

**Colvin, Michael** - Professor, School of Natural Sciences (Biology), UC Merced

**Heit, Evan** - Professor, School of Social Sciences, Humanities and Arts (Cognitive Science), Vice Chair, Academic Senate, UC Merced

**Kang, Sung-Mo “Steve”** - Chancellor, UC Merced; Professor, School of Engineering, UC Merced

**Park, Roderic B.** - Former Acting Chancellor, UC Merced, The Vice Chancellor Emeritus, UC Berkeley

**PANEL TWO: ORGANIZATION AND STRUCTURE OF THE MODERN RESEARCH UNIVERSITY**

**Conklin, Martha** - Professor, School of Engineering, Academic Senate Division Chair, UC Merced

**Drake, Michael** - Chancellor, UC Irvine

**Hull, Kathleen** - Assistant Professor, School of Social Sciences, Humanities and Arts (Anthropology), UC Merced

**Kantor, Shawn** - Professor, School of Social Sciences, Humanities and Arts (Economics), UC Merced

**Ojcius, David** - Vice Provost, Academic Personnel; Professor, School of Natural Sciences (Biology), UC Merced

**Traina, Samuel** - Vice Chancellor for Research and Graduate Dean, UC Merced

**Van Dyke, Nella** - Associate Professor, School of Social Sciences Humanities and Arts (Sociology), UC Merced

**Wright, Jeff** - Dean and Professor, School of Engineering, UC Merced

**Yudof, Mark** - President, University of California

### **PANEL THREE: GENERAL EDUCATION AND THE RESEARCH UNIVERSITY**

**Block, Gene** - Chancellor, UC Los Angeles

**Camfield, Gregg** - Professor, School of Social Sciences, Humanities and Arts (Literature), UC Merced

**Katehi, Linda** - Chancellor, UC Davis

**O'Day, Peggy** - Professor, School of Natural Sciences (Earth Sciences), UC Merced

**Ochsner, Robert** - Director of Writing Program, Director of Center for Research On Teaching Excellence, UC Merced

**Pallavicini, Maria** - Dean, School of Natural Sciences, UC Merced

**Viney, Christopher** - Vice Provost for Undergraduate Education and Professor of Engineering, UC Merced