

## **Section 11. Research**

### **GOALS**

The University of California's standing as the world's leading university system depends to a great extent on the excellence of its research. The California Master Plan for Higher Education designates the University of California as the primary state-supported academic agency for research. UC research contributes to the state and to the nation through discoveries that improve health, technology, welfare and the quality of life. The state's investment in UC helps make it one of the most competitive research enterprises in the nation, securing at least \$5 in federal and private funding for every state research dollar and generating discoveries and new knowledge across many different fields. In 2008-09, for example, UC researchers expended nearly \$4.9 billion in federal, state and private research dollars, which created thousands of jobs and helped support the graduate students who will be the state's next generation of scientists, engineers, entrepreneurs and leaders.

### **MEASURES**

Performance in achieving UC research goals may be measured in three ways: the academic quality and impact of UC research; economic and other societal benefits that flow directly from that research; and the quantity of research that is conducted. This section presents basic information on the quantity of research produced at UC (e.g., total research and development expenditures and number of faculty publications). Information on the academic quality of UC research—its impact as measured by citations to important papers, prestigious prizes won by faculty and their membership in highly regarded scholarly societies—can be found in the January 2010 Accountability Sub-Report on the Research Enterprise ([www.universityofcalifornia.edu/accountability](http://www.universityofcalifornia.edu/accountability)). UC's 2010 Budget for Current Operations contains information on the contributions and impacts of UC's research enterprise on the California economy (<http://budget.ucop.edu/rbudget/201011/2010-11BudgetforCurrentOperations-BudgetDetailrev.pdf>).

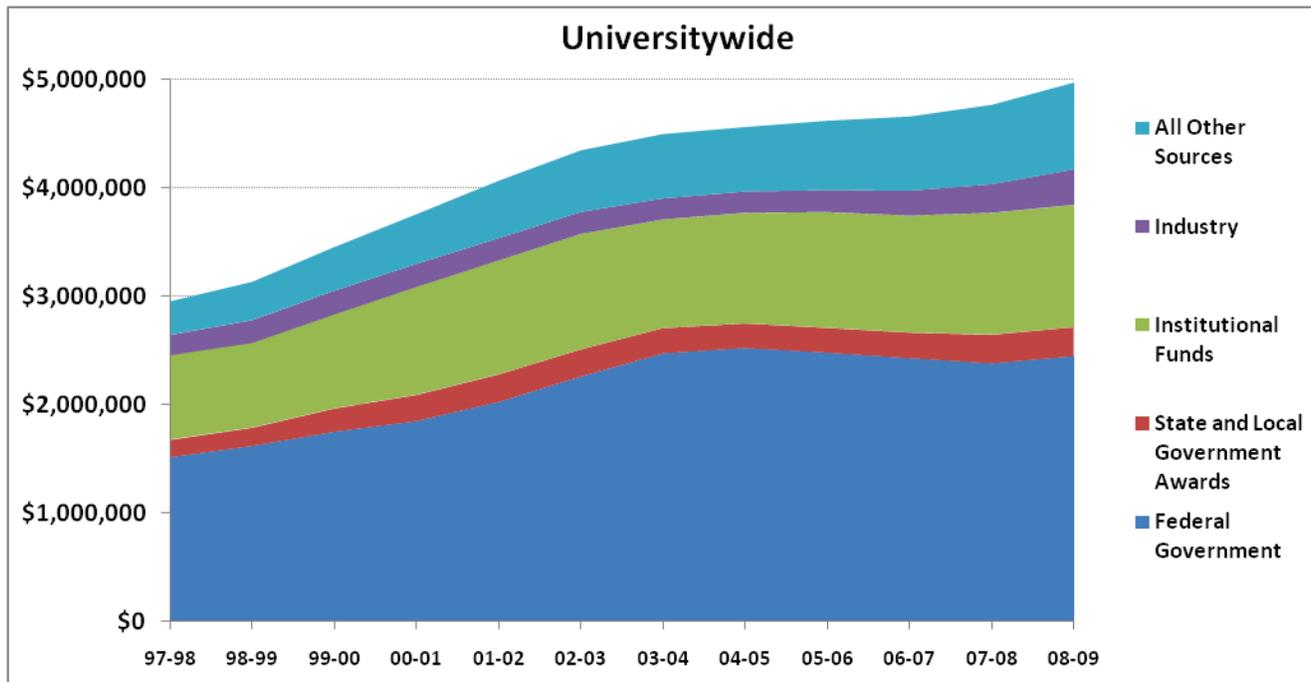
### **LOOKING FORWARD**

UC's research enterprise is the result of California's long-term planning and investment, dating back to the 1960 Master Plan. Currently it is quite robust, due largely to investments made by federal agencies. However, continuing state divestment from higher education and increasing competition for the best faculty and graduate students from national and international universities may emerge over the longer term as a threat, especially if faculty begin to leave the University and take their research funding with them.

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## Indicator 68

### Research and Development Expenditures by Source, 1997-98 to 2008-09



Note: Figures are in thousands of inflation-adjusted 2008-09 dollars.

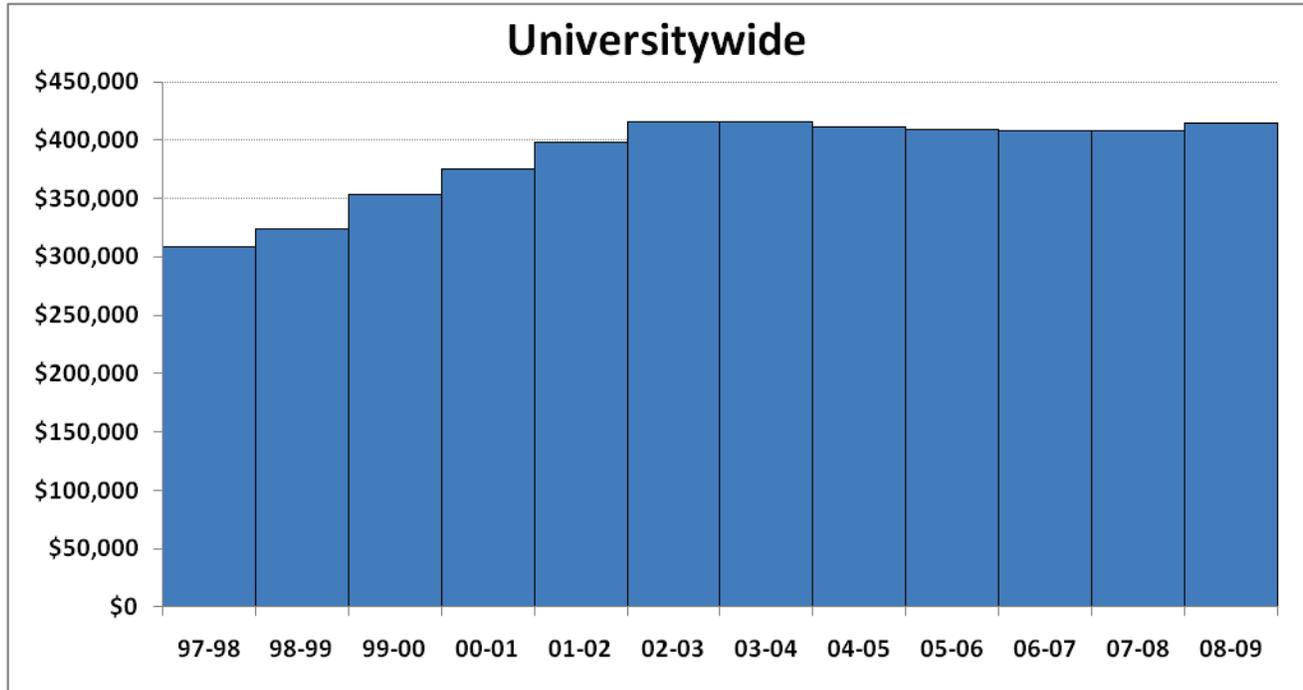
- In 2008-09, research expenditures at UC totaled \$4.9 billion and accounted for 25 percent of UC's total budget. The \$4.9 billion total is comprised of \$3.9 billion in direct support, \$0.7 billion in indirect cost recovery and \$0.3 billion in unreimbursed indirect costs.
- Federal funds are the University's single largest source of support for research, accounting for almost half (49 percent) of all University research expenditures in 2009.
- Institutional expenditures, which accounted for 23 percent of all R&D expenditures in 2008-09, come from a variety of sources, including state government appropriations, general-purpose awards from industry and foundations, endowment income and unreimbursed indirect costs.
- The category "all other sources," which accounted for 16 percent of all R&D expenditures in 2008-09, includes awards from nonprofit foundations, voluntary health agencies, and gifts from individuals that are restricted by the donor to research.

Source: National Science Foundation Research and Development Expenditures Survey

Note: Data include direct and indirect costs (both reimbursed and unreimbursed). Direct research expenditures go directly to the principal investigator in support of a specific research project; indirect research expenditures provide additional support to the University for the research infrastructure, such as maintaining buildings and research space, providing for technological infrastructure, libraries, utility costs, etc.

## Indicator 69

### Total Research and Development Expenditures per Senate Faculty, Universitywide, 1997-98 to 2008-09



Note: Figures are in thousands of inflation-adjusted 2008-09 dollars.

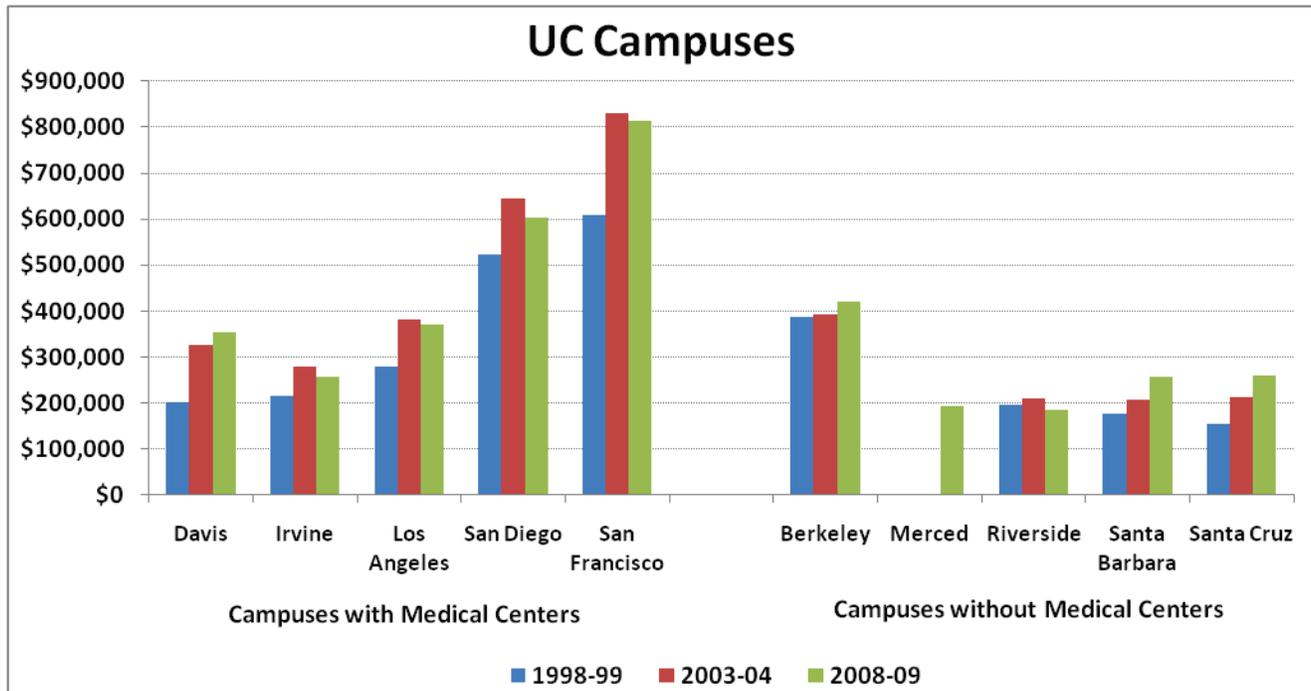
- Research expenditures are one among several different possible measures of research productivity.
- The STEM fields (life and physical sciences, technology, engineering and math) generate more research funding than the social sciences, arts and humanities.

Source: National Science Foundation Research and Development Expenditures Survey and UCOP Corporate Personnel System

Note: Data include direct and indirect costs (both reimbursed and unreimbursed). Direct research expenditures go directly to the principal investigator in support of a specific research project; indirect research expenditures provide additional support to the University for the research infrastructure, such as maintaining buildings and research space, providing for technological infrastructure, libraries, utility costs, etc.

Senate faculty are primarily those in the Professorial series, Professors in Residence series and the Professor of Clinical \_\_\_ series as well as a handful of other faculty members. Some non-Senate faculty members and some other academic employees conduct significant research and publish the results of their research. Some of these researchers may hold a joint Senate faculty title; if so, they are included in the Senate faculty headcount figures used here. Future versions of the accountability report will attempt to refine the number of faculty included in the “per faculty” calculations.

**Indicator 69 (continued) Total Research and Development Expenditures per Senate Faculty, UC Campuses, 1998-99, 2003-04 and 2008-09**



Note: Figures are in thousands of inflation-adjusted 2008-09 dollars.

- Almost one-third of the University’s total research awards come from the National Institutes of Health (NIH); these funds primarily flow to the five UC campuses that have medical schools: Davis, Irvine, Los Angeles, San Diego and San Francisco.
- The National Institutes of Health budget doubled between 1998-99 and 2002-03. This helps explain some of the increase in research expenditures per Senate faculty member that occurred over the past decade, especially at UC’s five medical school campuses.

**Indicator 70****Total Research and Development Expenditures, 1996-97 to 2008-09**

<b>Academic Year</b>	<b>Universitywide Total (thousands)</b>	<b>All Academic Institutions (thousands)</b>	<b>UC Total as % of All Institutions</b>
1996-97	\$ 2,716,145	\$ 31,530,860	8.6%
1997-98	2,957,541	32,988,220	9.0%
1998-99	3,137,724	34,683,210	9.0%
1999-00	3,456,922	37,233,821	9.3%
2000-01	3,759,393	39,676,203	9.5%
2001-02	4,067,698	43,221,201	9.4%
2002-03	4,347,928	46,711,153	9.3%
2003-04	4,496,990	49,225,053	9.1%
2004-05	4,561,869	50,486,061	9.0%
2005-06	4,619,699	50,939,977	9.1%
2006-07	4,658,138	51,281,490	9.1%
2007-08	4,765,930	52,160,240	9.1%
2008-09	4,971,049	-	

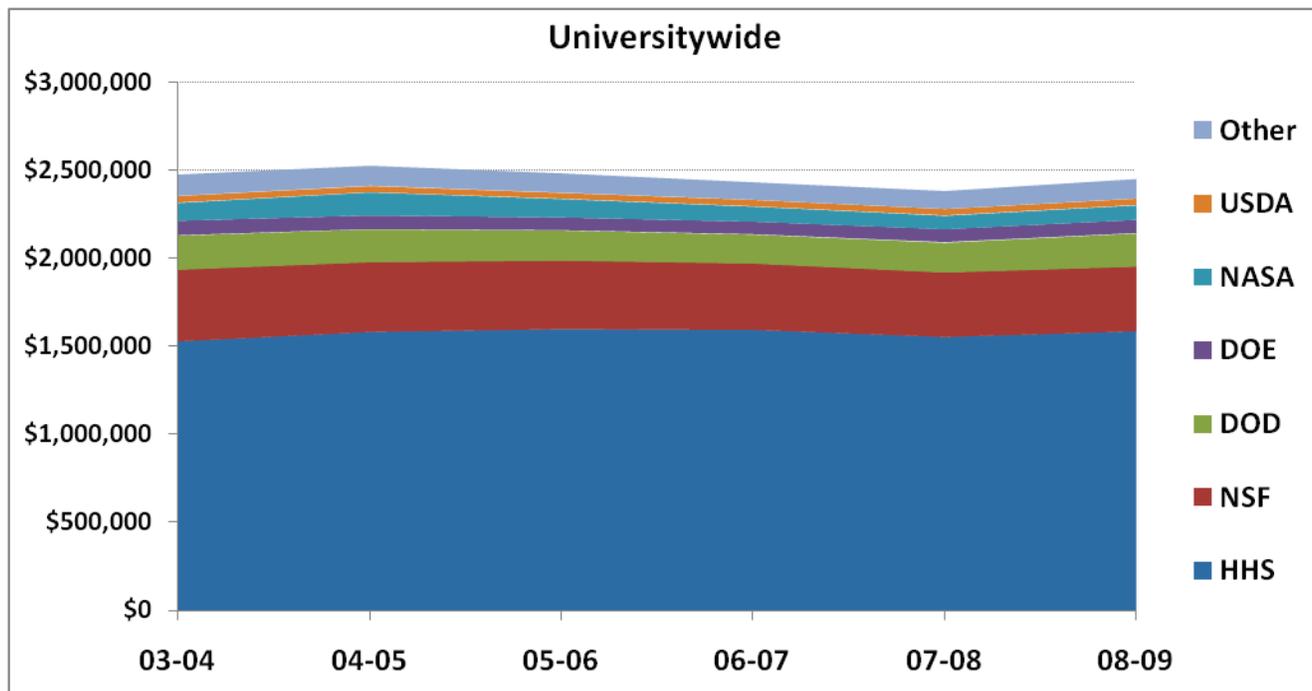
Note: Figures are in thousands of inflation-adjusted 2008-09 dollars.

- UC research expenditures increased about \$2.2 billion in inflation-adjusted dollars between 1996-97 and 2008-09, an increase of about 83 percent during that period.
- Much of this increase was due to the doubling of the National Institutes of Health budget that occurred between 1998-99 and 2002-03. Private support for research has also doubled over the last 10 years.

Source: National Science Foundation Research and Development Survey; data on all academic institutions had not been released as of March 15, 2010.

Note: Data include direct and indirect costs (both reimbursed and unreimbursed). Direct research expenditures go directly to the principal investigator in support of a specific research project; indirect research expenditures provide additional support to the University for the research infrastructure, such as maintaining buildings and research space, providing for technological infrastructure, libraries, utility costs, etc.

**Indicator 71**  
**Federally Funded Research and Development Expenditures by Agency, 2003-04 to 2008-09**



Note: Figures are in thousands of inflation-adjusted 2008-09. Key: HHS=Health and Human Services; NSF=National Science Foundation; DOD=Department of Defense; DOE=Department of Energy; NASA=National Aeronautics and Space Administration; USDA=United States Department of Agriculture.

- This chart shows the sources of federal research dollars at UC, as opposed to the sources of all research dollars (federal and non-federal) which are shown in Indicator 68.
- Almost two-thirds (64 percent) of the University's federal research awards in 2008-09 came from Health and Human Services (HHS), primarily through its affiliate, the National Institutes of Health (NIH).

Source: National Science Foundation Research and Development Expenditures Survey; NSF began collecting information by federal agency in FY 2003-04.

Note: Data include direct and indirect costs (both reimbursed and unreimbursed). Direct research expenditures go directly to the principal investigator in support of a specific research project; indirect research expenditures provide additional support to the University for the research infrastructure, such as maintaining buildings and research space, providing for technological infrastructure, libraries, utility costs, etc.

## Indicator 72

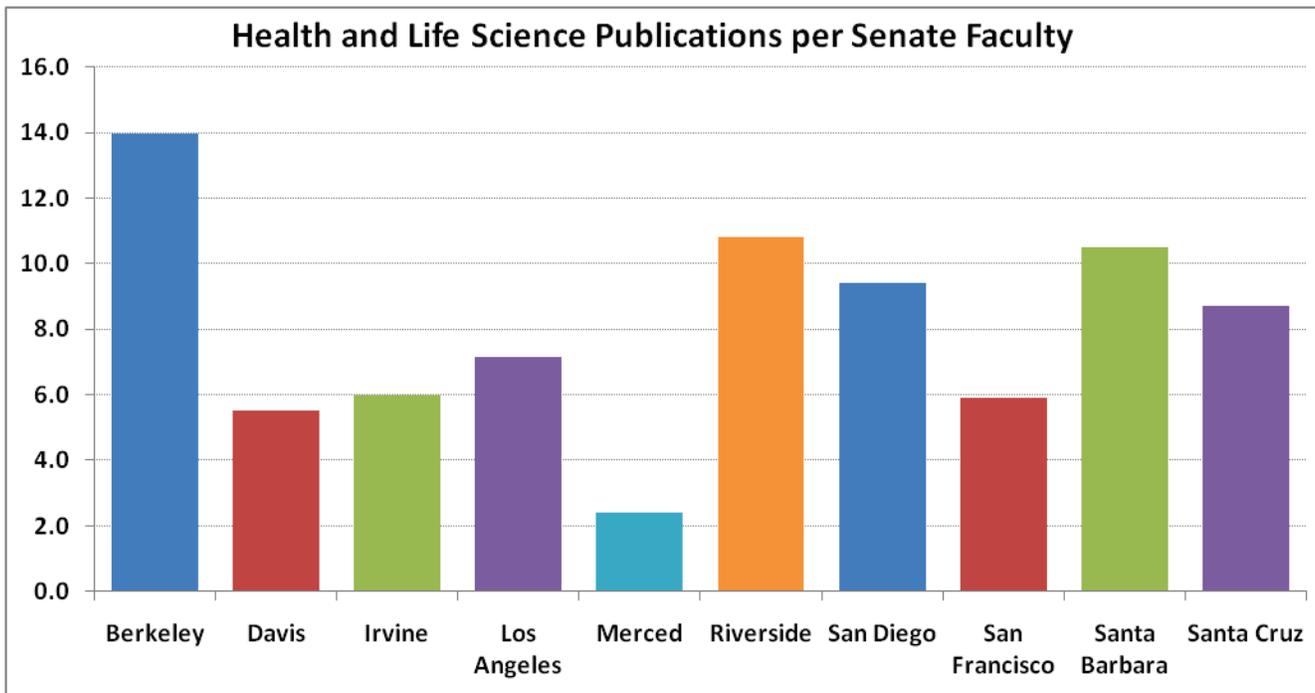
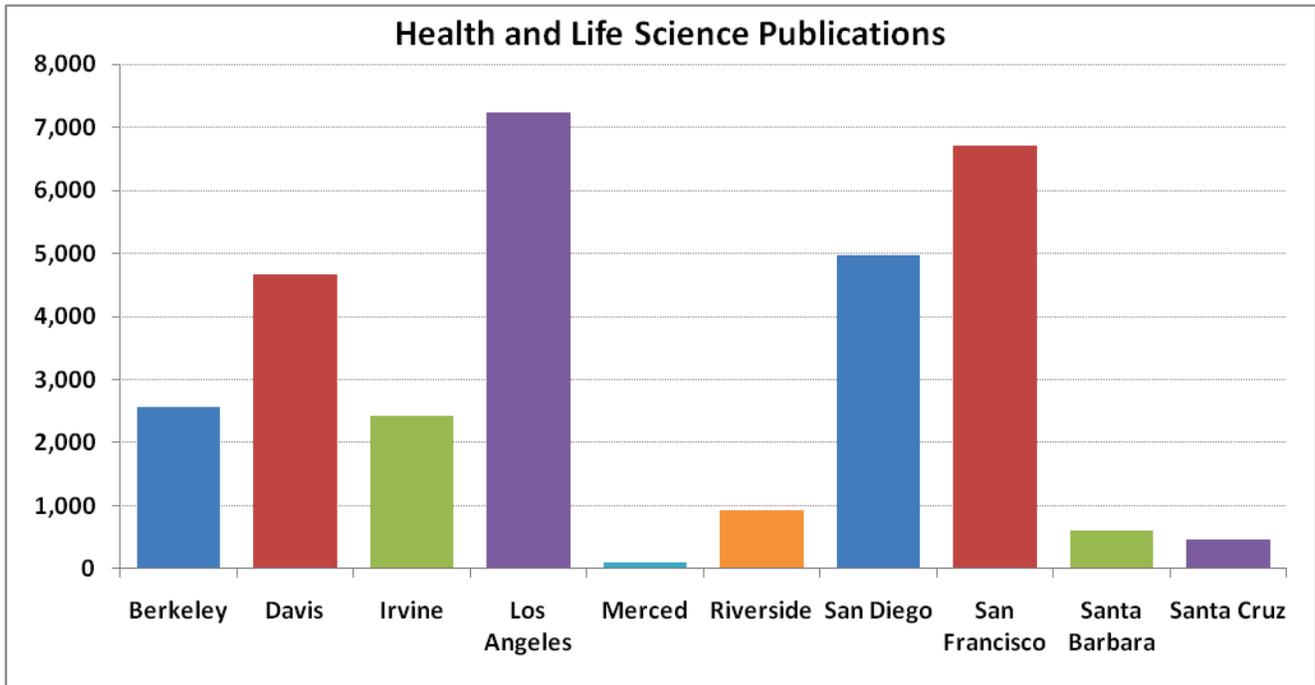
### Faculty Publications by Discipline, UC Campuses, 2008

The number of faculty publications is a measure, albeit imperfect, of the quantity of faculty research. The metrics on the next two pages show faculty publications across three broad academic disciplines—health and life sciences, physical sciences and engineering, and social sciences and humanities.

- The first chart in each set shows the total number of faculty publications by campus within each broad academic discipline; the second chart shows faculty publications by campus normalized by the number of Senate faculty within that discipline.
- Within a given academic discipline, differences in faculty publications are due to a number of factors, among them the size of departments and the number of faculty at each campus working in a particular field. Davis, Irvine, Los Angeles, San Diego, and San Francisco, for example, all have large medical centers and associated faculty.
- Published outputs cannot be used to compare faculty research productivity across disciplines. While all academic disciplines strive for excellence, different disciplines have different standards of merit and validation in terms of types, frequency and venues for the dissemination of research.
- Some disciplines favor shorter, multi-authored publications while other disciplines favor longer, sole-authored publications. Co-authorship, for example, is more common in the life and physical sciences, where credit is shared with a team of researchers, than in the social sciences and humanities, where papers tend to be sole-authored. Thus, faculty in the life and physical sciences may have more publications credited to them than faculty in the social sciences and humanities, in part, because of different norms regarding publication.
- Faculty in the social sciences and the humanities also publish books as well as scholarly articles; however, the SCOPUS database, from which the data for this indicator is drawn, does not contain books. Thus, it underestimates faculty research contributions in the social sciences and humanities.
- Capturing the quality of faculty research, as determined by the significance and importance of new ideas generated, is challenging. Future accountability reports will attempt to capture the quality of faculty research, in part, through analysis of faculty citation indices. The Academic Senate also assesses academic quality as part of the merit review process for individual faculty.

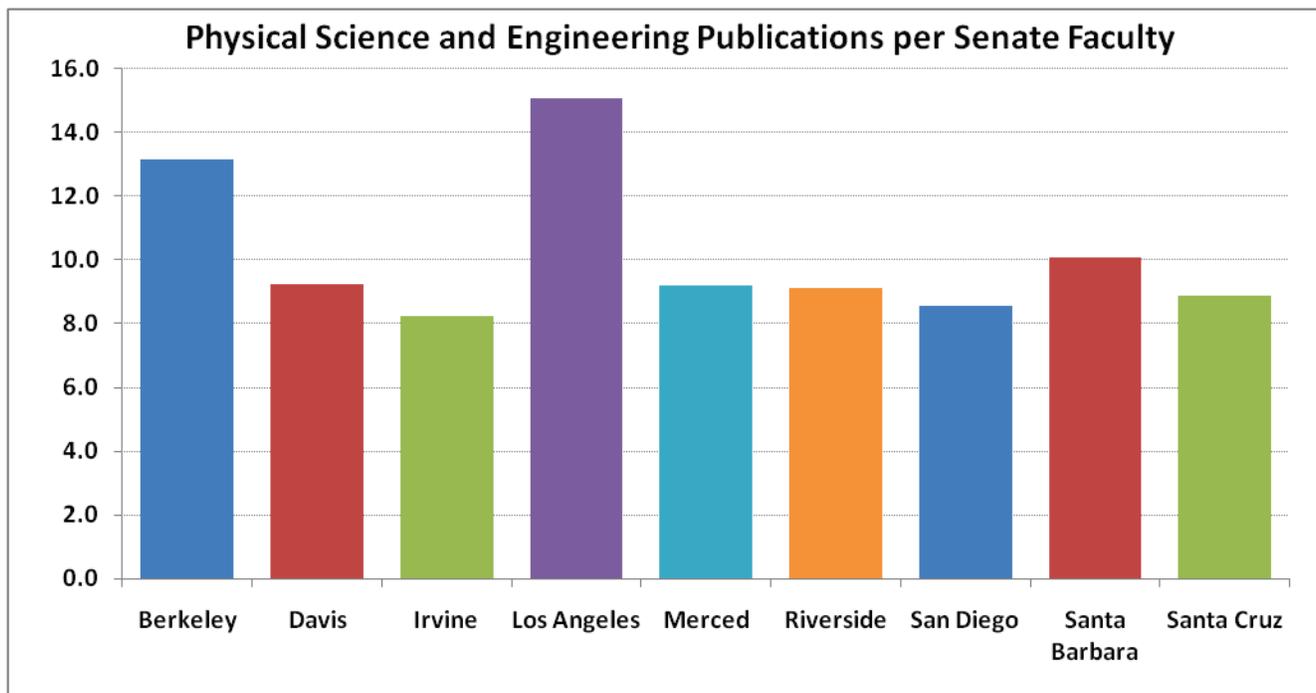
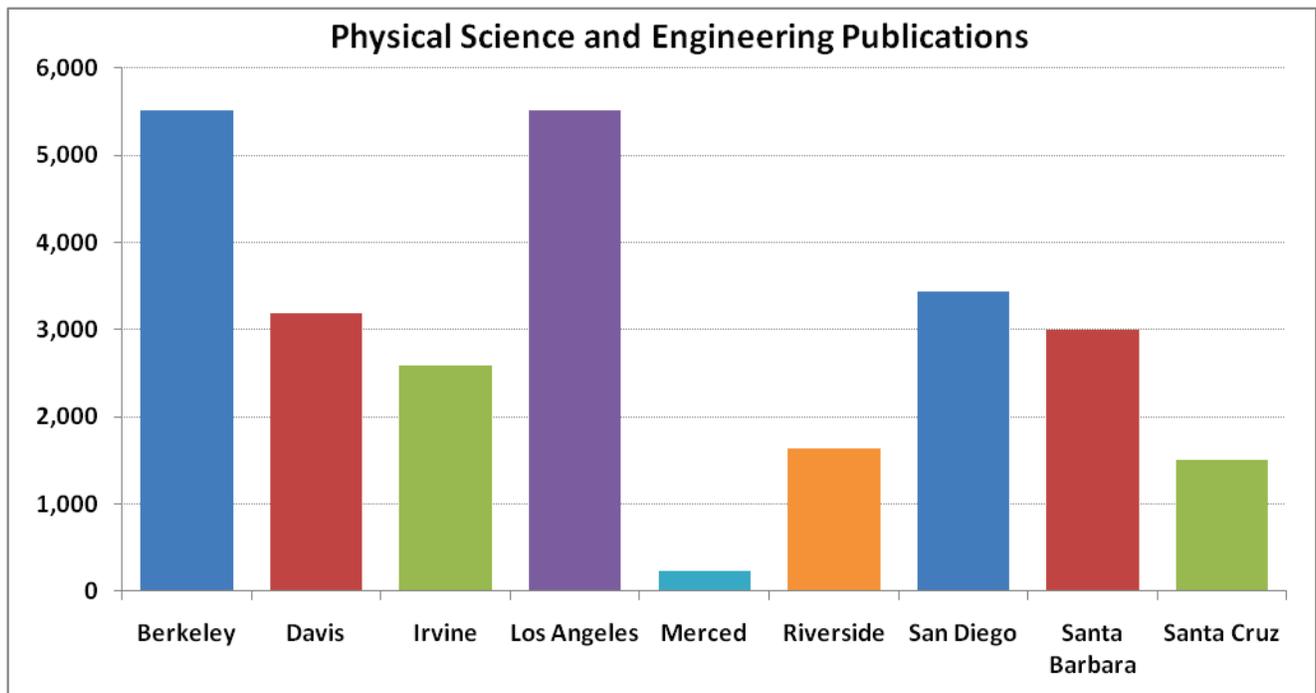
Note: Data on faculty publications comes from SCOPUS, a database of abstracts and citations for scholarly journal articles. SCOPUS covers nearly 18,000 titles from more than 5,000 international publishers; it includes 16,500 peer-reviewed journals in the scientific, technical, medical and social science (including arts and humanities) fields. SCOPUS assigns each scholarly journal in its database to a particular academic discipline; articles appearing in a specific journal are considered to have been published in the academic discipline assigned to that journal.

**Indicator 72 (continued) Faculty Publications by Discipline, UC Campuses, 2008**

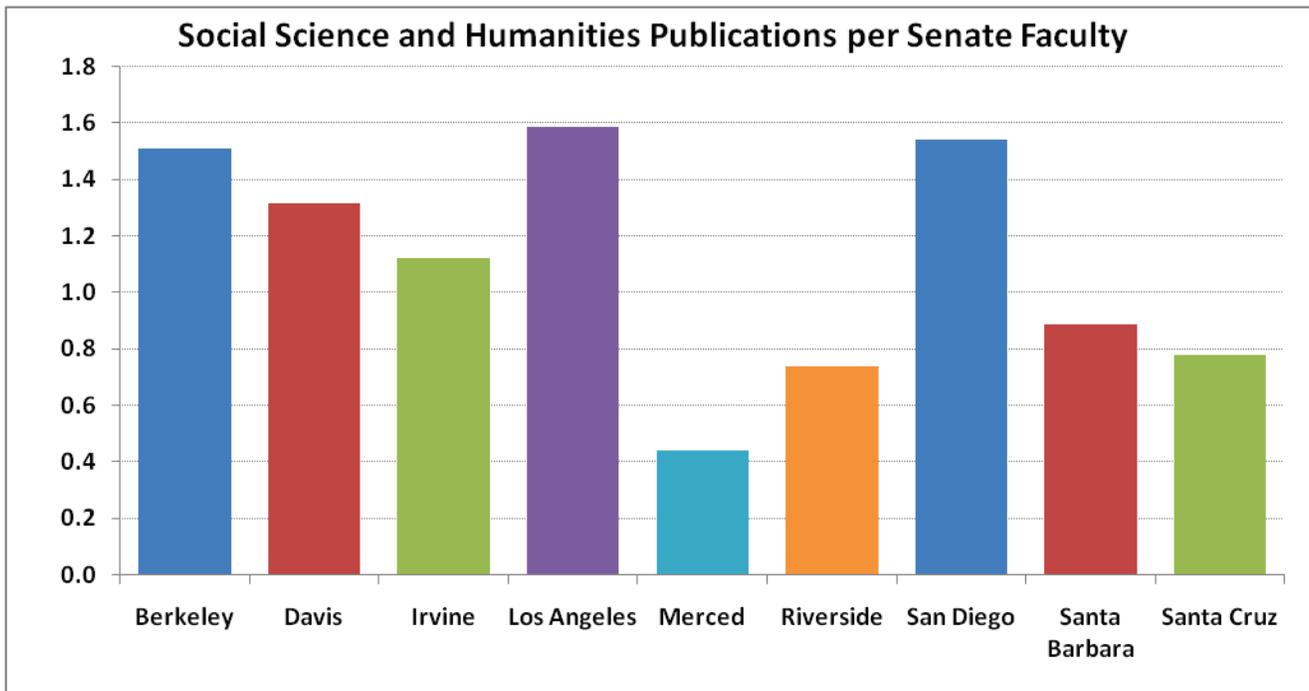
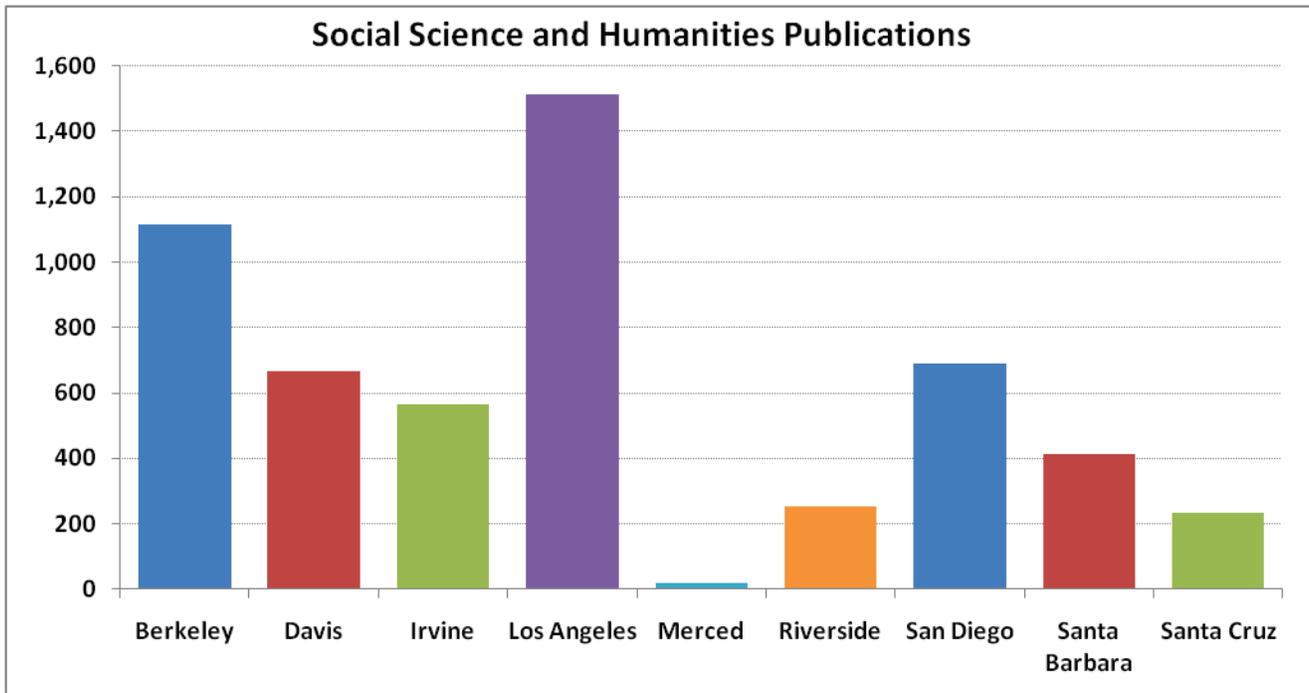


Note: The number of faculty used in the “per faculty” calculation are headcount of Senate faculty who are primarily those in the Professorial series, Professors in Residence series and the Professor of Clinical \_\_\_ series as well as a handful of other faculty members. Some non-Senate faculty members and some other academic employees conduct significant research and publish the results of their research. Some of these researchers may hold a joint Senate faculty title; if so, they are included in the Senate faculty headcount figures used here. Future versions of the Accountability Report will attempt to refine the number of faculty included in the “per faculty” calculations.

**Indicator 72 (continued) Faculty Publications by Discipline, UC Campuses, 2008**



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