

Undergraduate Education

UCR
Undergraduate
Student
Participation in
Research

2011-12 Tracking Report

Veronique M. Rorive and Steven Brint
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INTRODUCTION

The higher education literature recognizes that participation in faculty-mentored research or creative activity can offer many benefits to students (Kuh 2008). Faculty mentored research has been linked positively to student persistence (Nagda et al. 1998, Lopatto 2004) and increased college GPA (Fechheimer, Webber & Kleiber 2011). Student-faculty interaction in the research context is associated with enhanced student confidence (Blackburn et al 1981, Jacobi 1999, Koch and Johnson 2000) and academic growth (Pascarella and Terenzini 1991, Astin 1993, Tinto 1998). Students involved in research are more likely to pursue graduate studies (Hathaway et al. 2002; Russell, Hancock & McCullough 2007) and to experience graduate school success (Nnadozie et al. 2001).

Student survey reports may be unreliable indicators about undergraduate involvement in faculty-mentored research and creative activity outside of class. The key terms “faculty-mentored” and “research and creative activity” are often not defined and students may not report accurately for this reason. In addition, surveys such as the UCUES survey, which is used by all UC campuses, ask students whether they have *ever* participated in these experiences and consequently do not allow campuses to examine changes in participation rates from year to year.

This study examines the participation of UCR undergraduates in faculty-mentored research and creative activity during AY 2011-12 using institutional rather than survey data. We were able to track undergraduate students who worked with faculty in three categories: (1) campus-based sponsored research programs; (2) research course credit (students enrolled in 19x courses); and (3) paid positions.

Campus-based sponsored research programs include BCOE Undergraduate Research Opportunities, Minority Access to Research Careers (MARC-U), Mentoring Summer Research Internship Program (MSRIP), Medical Scholars Program, UC Leadership Excellence through Advanced Degrees (UC LEADS), CNAS Dean’s Fellowship, Gluck Fellows Program, TRIO Scholars, California Alliance for Minority Participation (CAMP UCR), Honors Program, UE Chancellor Research Fellowship, and UE Quarterly Mini Grants (source: see Appendix 2. UCR Undergraduate Research Program Workgroup contact list). The research course credits (19x and lower-division research courses) provide opportunities for faculty-mentored individual or group study. Paid positions are primarily from individual faculty members’ research grants and from the federal work-study program.

Although we know that some undergraduate students participate as volunteers, we have not yet found a consistent and reliable form of tracking student volunteers campus-wide. This study does not therefore include volunteers.

In the figures for this report we use the abbreviation “UGR” for undergraduate researchers. In addition to individual student participation, some undergraduate students participate in multiple research activities. For identification purposes we have labeled these students as “multiple participators.” We use the familiar abbreviations for the Colleges (BCOE for Bourns College of Engineering; CHASS for the College of Humanities, Arts, and Social Sciences; CNAS for the College of Natural and Agricultural Sciences; and SOBA for the School of Business Administration).

METHODS

This report uses fall, winter & spring quarter data from existing campus research mentoring programs, UC Riverside’s Student Information System (SIS), and Payroll/Personnel System. The data includes participant lists from campus-mentoring programs; generated lists of research course credits 19x course data and lower-division research courses, such as PSYC 096 (source: UCR SIS, see Appendix 1. Selected Courses); and Payroll/Personnel data search for Undergraduate Student Helpers Payroll titles 4921 & 4922 (source: Payroll/Personnel System). Student background information was collected from SIS and appended to data in Excel 2010.

FINDINGS

A review of the data shows that 2,344 undergraduate students participated in research under faculty mentorship in AY 2011-12. All percentages are calculated using the total enrollment of undergraduate students from F11. Table 1 shows undergraduate student participation by college and the type of research participation. The student researcher count represents 12.5% of F11 enrolled undergraduate students. Of these students, 177 (7.6%) participated in more than one undergraduate research activity.

Table 1. Undergraduate student participation in research by college and by type (campus research program, course credit, or pay).

College	Campus Research Program	Course Credit	Payroll	Total Individuals	F11 Enrollment (Headcount)	% of Total Enrolled Students
SOBA	1	145	30	176	1,176	15%
BCOE	65	296	85	446	2,138	21%

College	Campus Research Program	Course Credit	Payroll	Total Individuals	F11 Enrollment (Headcount)	% of Total Enrolled Students
CNAS	43	359	199	601	4,675	13%
CHASS	60	829	232	1121	10,700	11%
Total	169	1,629	546	2,344	18,689	12.5%

Each quarter during AY 2011-12, an average of 70 students participated in campus research programs, 900 students engaged in undergraduate research for course credit, and 350 students as paid student researchers if multiple participators are included.

Students participated in research for course credit and for pay in higher numbers during fall and spring quarters compared to the winter quarter (data not shown). We saw a 30% decrease in participation across all forms of research during winter quarter.

College

Figure 1 displays the percentage of campus enrollment for each college and the percentage of the undergraduate researchers who belong to each college. A disproportionate number of undergraduate researchers are BCOE students (19%) when compared to BCOE's share of campus enrollment (11%). CNAS students participate at about the same proportion as their share of campus enrollment, and CHASS students participate at a lower rate (47%) than their total share of campus enrollment (57%).

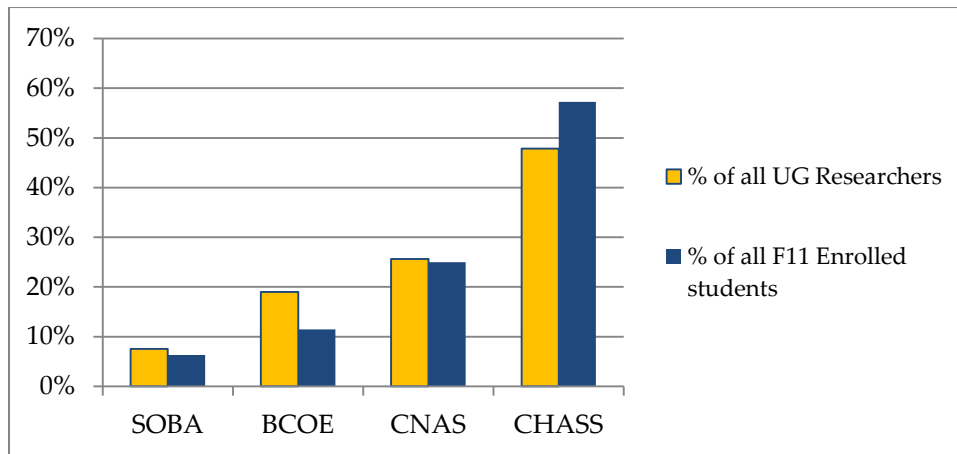


Figure 1. Undergraduate student participation in research by College (% of All UG Researchers; % of all F11 enrolled students)

Academic Year

Undergraduate student participation in research by year is shown in Figure 2. During AY 2011-12, upper-division undergraduate students were more likely than lower division

students to participate in faculty-mentored research. Not surprisingly, seniors were the most likely to participate; more than 60% of undergraduate researchers were seniors.

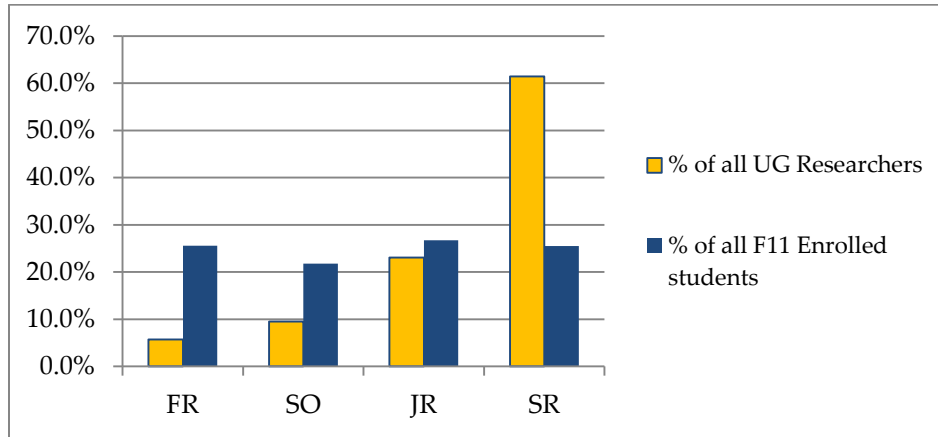


Figure 2. Undergraduate student participation in research by Year (% of All UG Researchers; % of all F11 enrolled students. Figure excludes data for second baccalaureate and limited enrolled students).

Gender

Women accounted for 52% and men accounted for 48% of undergraduate researchers (Figure 3). The gender ratio of undergraduate researchers is similar to the percentage of students enrolled in F11.

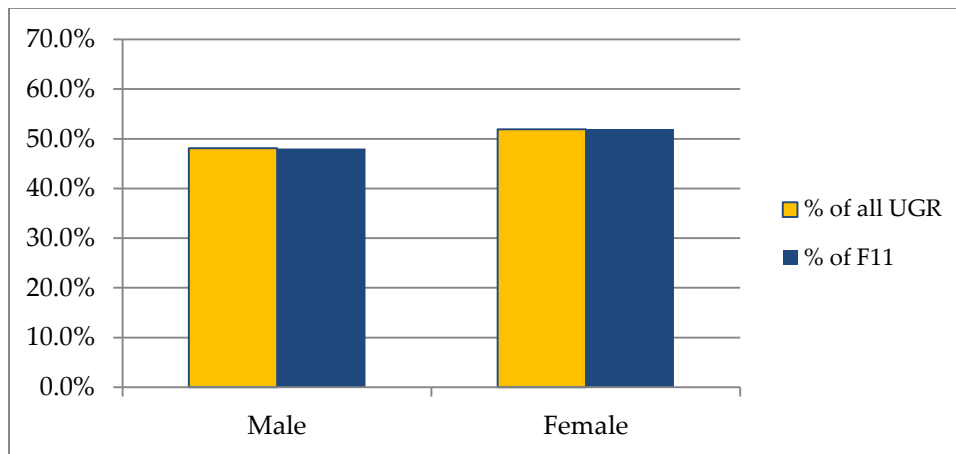


Figure 3. Undergraduate student researcher participation by gender.

College & Gender

Figure 4 depicts participation by college and gender. In SOBA, male participation rates mirror for male enrollment (7% of the campus total). SOBA enrolls 5% of campus women, and SoBA women participated at higher rate (7%) in research. BCOE enrolls 19% of males on campus but 32% of the males participating in research come from BCOE. CHASS

enrolls 65% of the women and nearly 50% of the men on campus but only 60% of the women and 35% of the male undergraduate researchers.

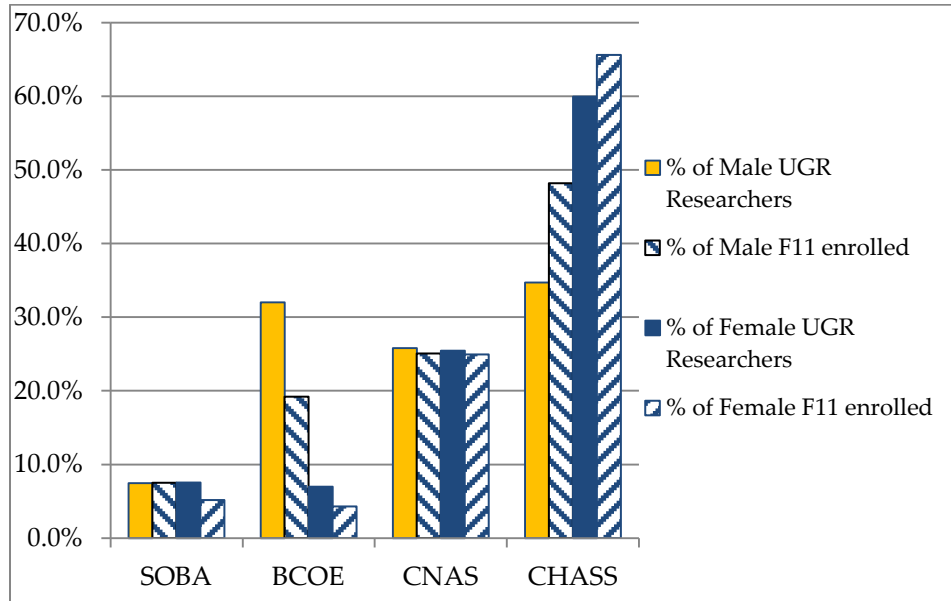


Figure 4. Undergraduate student researcher participation by college and gender (% of All UG Researchers; % of all F11 enrolled students).

Ethnicity

African-American and European heritage (white) students participated at higher rates compared to their proportion of enrollment, and Hispanic and Asian/Asian American students participated at lower rates. The differences in participation rates were not large.

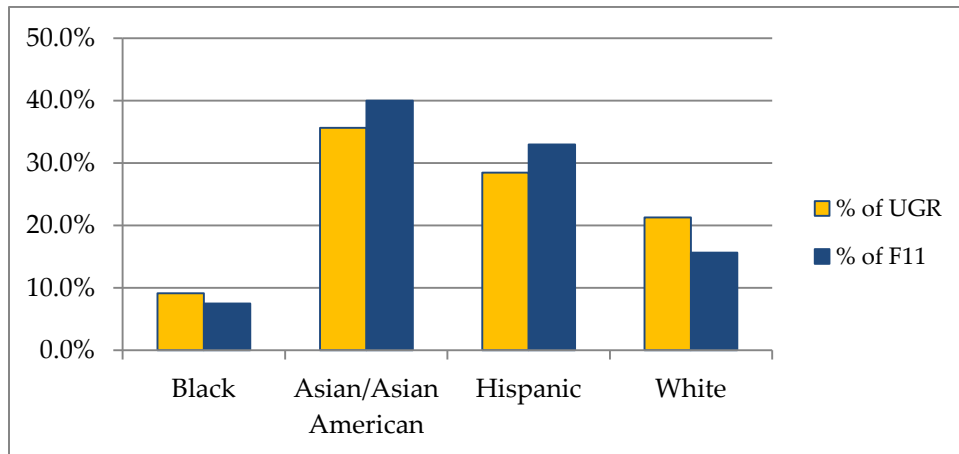


Figure 5. Undergraduate student participation in research by Ethnicity¹.

¹ Excludes students identified as “other” whose representation is less than 2%, and students who did not identify ethnicity.

Ethnicity & College

Relative to the proportion of groups enrolled in SOBA, African-American and Asian/Asian-American students participated in undergraduate research at high rates. All groups participated at high rates in BCOE with a particularly notable participation rate of Hispanic students. All groups participated at relatively high rates in CNAS, with a particularly notable participation rate among Asian/Asian-American students. Asian/Asian American students, however, participated at a notably low rate in CHASS.

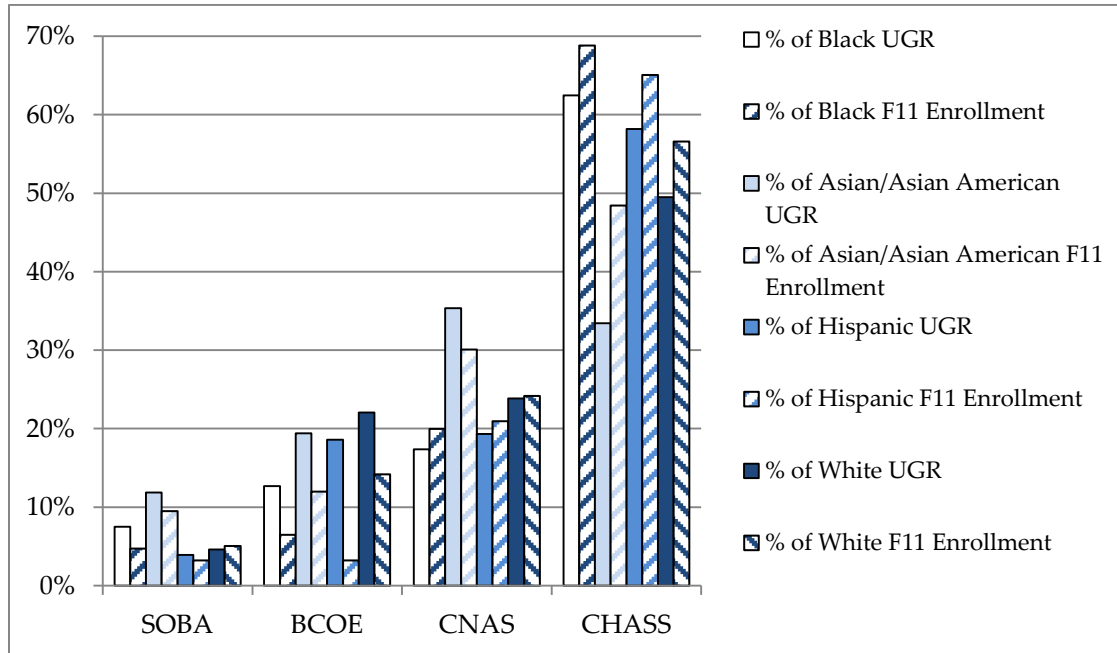


Figure 6. Undergraduate student participation in research by Ethnicity & College.

Multiple Participators

Some students participated in more than one type of faculty-mentored research or in more than one term during the academic year. We identified these 177 students as “multiple participators.”

Of the multiple participators, 52% were men and 48% were women, a higher proportion of men than either the campus or undergraduate researcher proportions. Women who were multiple participators were particularly likely to be located in CNAS. Students who were multiple participators were distributed similarly across ethnicities as students who participated in research only once during AY 2011-2012. As in the case of undergraduate researchers generally, African-American and European heritage students were more likely to be multiple participators.

DISCUSSION

This tracking report demonstrates that more than one in eight UCR undergraduates participated in faculty-mentored research or creative activity during the last academic year. We judge this to be a good, but suboptimal level of participation. A realistic goal for the campus would be to see one in five undergraduate students participating. The report establishes a baseline from which we can chart growth in undergraduate participation in faculty-mentored research and creative activity.

Participation rates are comparatively high in BCOE, CNAS, and SOBA, relative to the proportion of total campus enrollments in these colleges. Participation rates are near the campus average in CHASS. However, in CHASS some groups of students are not participating at levels that would be desirable. This is true for male students and for Asian/Asian-American students, in particular.

Although the campus currently has no method for capturing volunteers, we know that some students do volunteer in laboratories and on research groups for the experience of learning about research. In consultation with the Registrar, UE is pursuing the possibility of having students who participate in campus research programs as volunteers register for a zero-unit course in order to create a systematic campus-wide tracking system.

Questions for future studies include the identification of the type of benefit students gain from faculty-mentored research and creative activity experiences and how to incorporate students who could benefit but do not currently know about these opportunities.

REFERENCES

- Astin, A. 1993. What matters in college? Four critical years revisited. Josey-Bass, San Francisco, CA. - See more at: <http://uop.utah.edu/importance-research.php#sthash.eH7d3QIN.dpuf>.
- Blackburn, R. Cameron, S. and Chapman, D. 1981. "Cloning" in academia: mentorship and academic careers. *Research in Higher Education* 15: 315-327. - See more at: <http://uop.utah.edu/importance-research.php#sthash.eH7d3QIN.dpuf>.
- Fechheimer, M., Webber, K. and Kleiber, P.B. 2011. How well do undergraduate research programs promote engagement and success of students? *CBE-Life Sciences Education* 10(2): 156-163.

Hathaway, R., Nagda, B. and Gregerman, S. 2002. The relationship of undergraduate research participation to graduate and professional education pursuit: an empirical study. *Journal of College Student Development*: 43: 614-631 - See more at: <http://urop.utah.edu/importance-research.php#sthash.eH7d3QIN.dpuf>.

Jacobi, M. 1991. Mentoring and undergraduate academic success: a literature review, *Review of Educational Research* 61(4): 505-532 - See more at: <http://urop.utah.edu/importance-research.php#sthash.eH7d3QIN.dpuf>.

Koch, C. and Johnson, W. 2000. Documenting the Benefits of Undergraduate Mentoring. *Council on Undergraduate Research Quarterly* 20: 172-175 - See more at: <http://urop.utah.edu/importance-research.php#sthash.eH7d3QIN.dpuf>.

Kuh, G. 2008. High-impact educational practices: What they are, who has access to them, and why the matter. Washington, DC: Association of American Colleges and Universities.

Nagda, B.A., Gregerman, S.R., Jonides, J., von Hippel, W., and Lerner, J.S. 1998. Undergraduate student-faculty research partnerships affect student retention. *Review of Higher Education* 22: 55-72. - See more at: <http://urop.utah.edu/importance-research.php#sthash.eH7d3QIN.dpuf>.

Nnadozie, E., Ishimaya, J. and Chon, N. 2001. Undergraduate research internships and graduate school success. *J. College Student Development* 42(2): 145-156. - See more at: <http://urop.utah.edu/importance-research.php#sthash.eH7d3QIN.dpuf>.

Pascarella, E. and Terenzini, P. 1991. How college affects students: findings and insights from twenty years of research. Jossey-Bass Publishers, San Francisco, CA. - See more at: <http://urop.utah.edu/importance-research.php#sthash.eH7d3QIN.dpuf>.

Russell, S.H., Hancock, M.P., & McCullough, J. (2007). The pipeline: Benefits of undergraduate research experiences. *Science*, 316(5824), 548-549.

Tinto, V. 1998. Colleges as communities: taking research on student persistence seriously. *The Review of Higher Education* 21: 167-177. - See more at: <http://urop.utah.edu/importance-research.php#sthash.eH7d3QIN.dpuf>.

Appendix I. 2011-2012 UCR Courses selected that promote and provide undergraduate research and creative activity opportunities.

Dept	Course #	Course Title	CS	193	Design Project
PSYC	96	Lower division research	ETST	193	Senior Research Seminar
HNPG	97	Honors Lower-Division Research	MCS	193	Senior Seminar
ART	137	Advanced Sculpture	ECON	193A	Senior Seminar
HNPG	151	individual projects in research or creative activity	ENGL	193A	Senior Seminar
CRWT	164C	Adv Playwriting	ECON	193B	Senior Seminar
DNCE	167	Dance Production	ENGL	193B	Senior Seminar
DNCE	168	Dance Touring Ensemble	BLSC	193H	Senior Honors Seminar
CRWT	170	Adv Poetry Workshop	PSYC	193H	Senior Honors Seminar
THEA	170	Advanced Theatre	CBNS	194	Independent Reading
CRWT	172	Adv Fiction Workshop	MUS	194	Independent Reading
ART	175	Advanced Digital Work	ART	195	Senior Thesis
RLST	175	Religion and Human Rights	AST	195	Senior Thesis
BIEN	175A/B	Senior Design	CHN	195	Senior Thesis
EE	175A/B	Senior Design	CRWT	195	Senior Thesis
ENVE	175A/B	Senior Design Project	HASS	195	Senior Thesis
ME	175A/B/C	Professional Topics in Engineering	LING	195	Senior Thesis
MSE	175A/B	Senior Design	MUS	195	Senior Thesis
EE	175S	Senior Design Project	PHIL	195	Senior Thesis
POSC	177H	Honors Thesis	PSYC	195	Senior Thesis
CS	179	Projects in Comp Sci	RLST	195	Senior Thesis
CRWT	180	Professional Poetry Workshop	RUSN	195	Senior Thesis
CRWT	182	Professional Fiction Workshop	SOC	195	Senior Thesis
ART	185	Senior Thesis Seminar	THEA	195	Senior Thesis
CRWT	187	Metafiction	WMST	195	Senior Thesis
ANTH	190	Special Studies/Research	ANTH	195A/B/C	Senior Thesis
BPSC	190	Special Studies/Research	GBST	195A/B/C	Senior Thesis
BUS	190	Special Studies/Research	GEO	195A/B/C	Senior Thesis
CBNS	190	Special Studies/Research	PHYS	195A/B/C/D	Senior Thesis
EDUC	190	Special Studies/Research	BLSC	195H	Senior Honors Thesis
ETST	190	Special Studies/Research	BPSC	195H	Senior Honors Thesis
MUS	190	Special Studies/Research	CPLT	195H	Senior Thesis
WMST	190	Special Studies/Research	CRWT	195H	Senior Honors Thesis
CRWT	191	Seminar in Creative Writing	FREN	195H	Senior Honors Thesis
MUS	191	Seminar in Music	HNPG	195H	Senior Honors Thesis
NASC	191S	Seminar in Sacramento	LING	195H	Senior Honors Thesis
NASC	191W	Seminar in Washington D.C.	PSYC	195H	Senior Honors Thesis
BLSC	192H	Junior Honors Seminar	CPLT	196	Senior Research Paper
ETST	192H	Junior Honors Seminar	HASS	196	Senior Research Paper
PSYC	192H	Junior Honors Seminar	BCH	197	Research for Undergraduate Students
CPLT	193	Capstone Research Seminar	BIEN	197	Research for Undergraduates

BIOL	197	Introduction to Research	STAT	198-I	Individual Internship in Statistics
BLCN	197	Research for Undergraduates	NASC	198-I	Individual Internship in the Natural and Agricultural Sciences
BPSC	197	Research for Undergraduates	THEA	198-I	Individual internship in Theater
CBNS	197	Research for Undergraduates	BIOL	199	Junior/Senior Research
CEE	197	Research for Undergraduates	BLCN	199	Senior Research
CHEM	197	Research for Undergraduates	BPSC	199	Senior Research
EE	197	Research for Undergraduates	CBNS	199	Senior Research
ENSC	197	Research for Undergraduates	CHEM	199	Senior Research
ENTM	197	Research for Undergraduates	ENTM	199	Senior Research
MATH	197	Research for Undergraduates	HIST	199	Senior Research
MCBL	197	Research for Undergraduates	MEIS	199	Senior Research
ME	197	Research for Undergraduates	NEM	199	Senior Research
NEM	197	Research for Undergraduates	POSC	199	Senior Research
PCST	197	Research for Undergraduates	THEA	199	Senior Research
PHYS	197	Research for Undergraduates	ANTH	199H	Senior Honors Research
PLPA	197	Research for Undergraduates	BUS	199H	Senior Honors Research
POSC	197	Research for Undergraduates	CHEM	199H	Senior Honors Research
PSYC	197	Research for Undergraduates	ECON	199H	Senior Honors Research
RLST	197	Research for Undergraduates	ENTM	199H	Senior Honors Research
SOC	197	Research for Undergraduates	HIST	199H	Senior Honors Research
STAT	197	Research for Undergraduates	MUS	199H	Senior Honors Research
SWSC	197	Research for Undergraduates	PSYC	199H	Senior Honors Research
HNPG	197H	Honors Research for Undergraduates	SOC	199H	Senior Honors Research
BMSC	197L	Research for Undergraduates	SPN	199H	Senior Honors Research
ETST	198G	Internship - Group	STAT	199H	Senior Honors Research
BLSC	198H	Junior Honors Research	CWPA	264	Playwriting
PSYC	198H	Junior Honors Research	CWPA	270	Poetry Workshop
BUS	198I	Indiv Internship/incl combo of acad w/field	ART	290	Directed Studies/Individual study
HASS	198-I	Internship	CMDB	297	Directed Research/Research-Exptl Studies
MCS	198-I	Individual Internship in Media and Cultural Studies			

Appendix 2. UCR Undergraduate Research Program Workgroup contact list.

University Programs	Contact Person
BCOE Undergraduate Research Opportunities	Jun Wang (951.827.2708), jun.wang@ucr.edu
CAMP-UCR (California Alliance for Minority Participation) camp.ucr.edu	Michelle Butler (951.827.3581), michelle.butler@ucr.edu
Chancellor Research Fellowship http://ugr.ucr.edu/chancellor_fellowship	Veronique Rorive (951.827.6254), veronique.rorive@ucr.edu
CNAS Scholars (College of Natural & Agricultural Sciences) cnasscholars.ucr.edu	CNAS Academic Advising Center (951.827.7294), cnasstudent@ucr.edu
Gluck Fellows Program of the Arts gluckprogram.ucr.edu	Christine Leapman (951.827.5739), christine.leapman@ucr.edu
HSI STEM PATHWAYS	BCOE - Jun Wang (951.827.2708), jun.wang@ucr.edu CNAS - Michelle Butler (951.827.3581), michelle.butler@ucr.edu
Lindon Barret Scholars Mentoring Program english.ucr.edu/lindon	Erica Edwards (951.827.5301), erica.edwards@ucr.edu
MARC-U STAR: Pre-Trainee Program Minority Access to Research Careers - Undergraduate Student Training in Academic Research www.marcu.ucr.edu	Nancy Day (951.827.5449), nancy.day@ucr.edu
MARC-U STAR: Two-Year Trainee Program Minority Access to Research Careers - Undergraduate Student Training in Academic Research www.marcu.ucr.edu	Nancy Day (951.827.5449), nancy.day@ucr.edu
MSP (Medical Scholars Program)	Teresa Cofield (951.827.4935), teresa.cofield@ucr.edu
MSRIP (Mentoring Summer Research Internship Program) graduate.ucr.edu/msrip.html	Maria Franco-Aguilar (951.827.3680), maria.franco@ucr.edu
TRiO Scholars Programs http://deanofstudents.ucr.edu/TrioScholars/	Micki Clowney (951.827.3888), micki.clowney@ucr.edu
UC LEADS (UC Leadership Excellence through Advanced Degrees) graduate.ucr.edu/uc_leads.html	Maria Franco-Aguilar (951.827.3680), maria.franco@ucr.edu
Undergraduate Research in the Community	Rebecca Spence Dobias (951.827.7739), rebecca.spencedobias@ucr.edu
University Honors	Scott Silverman (951.827.3363), scott.silverman@ucr.edu

