2021 Taulbee Survey
CS Enrollment Grows at All Degree Levels, With Increased Gender Diversity

By Stuart Zweben and Betsy Bizot

This article and the accompanying figures and tables present the results from the 51st annual CRA Taulbee Survey[1]. The survey, conducted annually by the Computing Research Association, documents trends in student enrollment, degree production, employment of graduates, and faculty salaries in academic units in the United States and Canada that grant the Ph.D. in computer science (CS), computer engineering (CE), or information (I)[2]. Most of these academic units are departments, but some are colleges or schools of information or computing. In this report, we will use the term "department" to refer to the unit offering the program.

CRA gathers survey data during the fall. Responses received by February 22, 2022 are included in the analysis. The period covered by the data varies from table to table. Degree production and enrollment (Ph.D., Master's, and Bachelor's) refer to the previous academic year (2020-21). Data for new students in all categories refer to the current academic year (2021-22). Projected student production and information on faculty salaries are also for the current academic year; salaries are those effective January 1, 2022.

We surveyed a total of 282 Ph.D.-granting departments and received responses from 171, for an overall response rate of 61 percent. Last year we had eight more total respondents and a 64 percent response rate. The response rates from CE and Canadian departments in particular continue to be low. The U.S. CS response rate of 73 percent is, as usual, the highest of all of the categories; it is lower than last year's 78 percent and at the low end of the response rates for the past quarter century. Figure 1 shows the history of the survey's response rates. Response rates are inexact because some departments provide only partial data, and some institutions provide a single joint response for multiple departments. Thus, in some tables the number of departments shown as reporting will not equal the overall total number of respondents shown in Figure 1 for that category of department.

To account for the changes in response rate, we will comment not only on aggregate totals but also on averages per department reporting or data from those departments that responded to both 2020 and 2021 surveys. This is a more meaningful indication of the one-year changes affecting the data.

Degree, enrollment, and faculty salary data for the U.S CS departments are stratified according to: a) whether the institution is public or private; and b) the tenure-track faculty size of the reporting department. The faculty size strata deliberately overlap, so that data from most departments affect multiple strata. This may be especially useful to departments near the boundary of one stratum. Salary data is also stratified according to the population of the locale in which the institution is located[3]. These stratifications allow our readers to see multiple views of important data, and hopefully gain new insights from them. In addition to tabular presentations of data, we will use "box and whisker" diagrams to show medians, quartiles, and the range between the 10th and 90th percentile data points.

This year's survey was conducted in a hybrid period of the COVID-19 pandemic. While institutions are open during the 2021-22 academic year, varying approaches to learning are being employed, based on local COVID conditions and, in some cases, government mandates. The data we report here should be interpreted with appropriate COVID-related caveats. This is particularly true of comparisons with prior years. Insights into department experiences with COVID were obtained by two special surveys conducted by CRA in early summer 2020, one of individual faculty and one of chairs or other department representatives; those results are available from the Data tab of the CRA website https://cra.org/. Last year's Taulbee Survey also asked special questions to gain appreciation of the effect of educational adjustments on 2020-21 student enrollment, and offered some comments in the report about the responses we

received. This year, we asked departments how they attempted to mitigate the impact of the pandemic on junior faculty. In the conclusion, we summarize the departments' responses, and also comment on this year's student data viz a viz the pandemic.

We thank all of the respondents to this year's questionnaire, and especially appreciate their continued willingness to provide data during difficult periods such as these. The participating departments are listed at the end of this article. CRA member respondents will again be given the opportunity to obtain certain survey information for a self-selected peer group. Instructions for doing this will be emailed to all such departments.

Doctoral Degree Production, Enrollment, and Employment

(Tables 1, D1-D10; Figures D1-D6)

Degree Production

Reported total doctoral degree production was lower in 2020-21 than in 2019-20 but so was the number of departments

Figure 1. Number of Respondents to the Taulbee Survey

Year	US CS Depts.	US CE Depts.	Canadian	US Information	Total
1995	110/133 (83%)	9/13 (69%)	11/16 (69%)		130/162 (80%)
1996	98/131 (75%)	8/13 (62%)	9/16 (56%)		115/160 (72%)
1997	111/133 (83%)	6/13 (46%)	13/17 (76%)		130/163 (80%)
1998	122/145 (84%)	7/19 (37%)	12/18 (67%)		141/182 (77%)
1999	132/156 (85%)	5/24 (21%)	19/23 (83%)		156/203 (77%)
2000	148/163 (91%)	6/28 (21%)	19/23 (83%)		173/214 (81%)
2001	142/164 (87%)	8/28 (29%)	23/23 (100%)		173/215 (80%)
2002	150/170 (88%)	10/28 (36%)	22/27 (82%)		182/225 (80%)
2003	148/170 (87%)	6/28 (21%)	19/27 (70%)		173/225 (77%)
2004	158/172 (92%)	10/30 (33%)	21/27 (78%)		189/229 (83%)
2005	156/174 (90%)	10/31 (32%)	22/27 (81%)		188/232 (81%)
2006	156/175 (89%)	12/33 (36%)	20/28 (71%)		188/235 (80%)
2007	155/176 (88%)	10/30 (33%)	21/28 (75%)		186/234 (79%)
2008	151/181 (83%)	12/32 (38%)	20/30 (67%)	9/19 (47%)	192/264 (73%)
2009	147/184(80%)	13/31 (42%)	16/30 (53.3%)	12/20 (60%)	188/265 (71%)
2010	150/184 (82%)	12/30 (40%)	18/29 (62%)	15/22 (68%)	195/265 (74%)
2011	142/185 (77%)	13/31 (42%)	13/30 (43%)	16/21 (76%)	184/267 (69%)
2012	152/189 (80%)	11/32 (34%)	14/30 (47%)	16/26 (62%)	193/277 (70%)
2013	144/188 (77%)	10/30 (33%)	14/26 (54%)	11/22 (50%)	179/266 (67%)
2014	143/188 (76%)	13/31 (42%)	12/26 (46%)	13/19 (68%)	181/268 (68%)
2015	146/190(77%)	8/32 (25%)	12/26 (46%)	12/18 (67%)	178/266 (67%)
2016	150/188 (80%)	8/33 (24%)	11/26 (42%)	14/21 (67%)	183/268 (68%)
2017	148/192 (77%)	8/35 (23%)	11/30 (37%)	14/24 (58%)	181/281 (64%)
2018	143/195 (73%)	5/34 (15%)	12/30 (40%)	14/24 (58%)	174/283 (61%)
2019	148/192 (77%)	7/35 (20%)	11/29 (38%)	15/22 (68%)	181/278 (65%)
2020	150/193 (78%)	6/35 (17%)	8/29 (28%)	15/22 (68%)	179/279 (64%)
2021	142/195 (73%)	6/35 (17%)	8/29 (28%)	15/23 (65%)	171/282 (61%)

reporting. The production rate per department actually was slightly higher in 2020-21. Only 140 departments reported their Ph.D. production this year, compared with 149 last year. The 140 departments produced 1,893 Ph.D.s in 2020-21, compared with 1,997 degrees produced in 2019-20 by the 149 departments. This gives an average production of 13.5 per department, compared with 13.4 in 2019-20. Among U.S. CS departments, the production rate this year is 14.3 compared to 14.2 last year (Table D1).

Among all departments reporting both this year and last year, the number of total doctoral degrees rose by 4.1 percent. Among U.S. CS departments reporting both years, the increase was 3.6 percent (Table 1).

Gender diversity among 2020-21 Ph.D. recipients improved considerably, from 19.9 percent to 23.3 percent in CS, and from 21.7 percent to 24.7 percent overall (Table D2). Among Ph.D. recipients whose ethnicity is known, Non-resident Aliens comprised slightly over 2/3 of the total In CS and overall, and more than half of the I total. Each of these fractions is larger than reported last year, for the second year in a row. In CE, by contrast, the fraction of Non-resident Alien recipients was slightly below 3/4, while it was just over 3/4 last year. The fraction of White Ph.D. recipients in 2020-21, compared with that in 2019-20, went in the opposite direction from that of Non-resident Aliens in all three areas and overall (Table D3). The combined percentage of CS doctoral graduates who were American Indian or Alaska Native, Black or African American, Native Hawaiian/Pacific Islander, Hispanic, or Multiracial Non-Hispanic was 4.4 percent, compared with 3.8 percent in 2019-20.

Similar to last year, in CS a higher percentage of female than male doctoral recipients were White. An equal percentage of male and female CS recipients were Non-resident Alien, while last year a slightly higher percentage of female than male recipients were Non-resident Alien. (Table D9).

Doctoral Program Enrollment

The total doctoral enrollment reported by this year's responding departments decreased by 1.5 percent when all departments are included, and decreased by 2.3 percent if only U.S. CS departments are included. However, this appears to be a

Table 1. Degree Production and Enrollment Change From Previous Year

	Total						Only Departments Responding Both Years					
	US CS Only			All Departments			US CS Only			All Departments		
PhDs	**2020**	**2021**	**% chg**	**2020**	**2021**	**% chg**	**2020**	**2021**	**% chg**	**2020**	**2021**	**% chg**
PhD Awarded	1,777	1,691	-4.80%	1,997	1,893	-5.20%	1,587	1,644	3.60%	1,756	1,828	4.10%
#Units PhD Awd	125	113	-9.60%	149	136	-8.70%	103	103		122	122	
PhD Enrollment	16,429	16,052	-2.30%	18,725	18,448	-1.50%	15,360	15,972	4.00%	17,228	18,056	4.80%
#Units PhD Enr	136	125	-8.10%	162	150	-7.40%	121	121		142	142	
New PhD Enroll	2,874	3,146	9.50%	3,329	3,624	8.90%	2,668	3,079	15.40%	3,065	3,505	14.40%
#Units New PhD	136	126	-7.40%	162	152	-6.20%	121	121		143	143	
Bachelor's	**2020**	**2021**	**% chg**	**2020**	**2021**	**% chg**	**2020**	**2021**	**% chg**	**2020**	**2021**	**% chg**
BS Awarded	33,984	34,690	2.10%	39,870	40,552	1.70%	31,674	33,702	6.40%	36,533	38,427	5.20%
#Units BS Awd	130	122	-6.20%	152	144	-5.30%	115	115		132	132	
BS Enrollment	150,331	156,584	4.20%	177,290	182,810	3.10%	142,430	150,443	5.60%	162,501	170,711	5.10%
#Units BS Enr	128	124	-3.10%	151	147	-2.60%	116	116		134	134	
New BS Majors	32,368	34,078	5.30%	40,291	39,865	-1.10%	28,958	31,913	10.20%	33,773	36,958	9.40%
#Units New BS	119	115	-3.40%	141	137	-2.80%	103	103		121	121	
BS Enroll/Dept	1,174.50	1,262.80	7.50%	1,174	1,244	5.90%	1,228	1,296.9	5.60%	1,212.7	1,274	5.10%

byproduct of the decrease in the number of departments responding this year. When only departments that reported both years are considered, doctoral enrollment increased 4.8 percent when aggregated across all department types, and increased by 4.0 percent across U.S. CS departments (Table 1). Last year there were increases whether or not departments that reported in two consecutive years were considered. Where there are increases this year, they are lower than the corresponding increases reported last year.

The fraction of females among enrolled students rose for the sixth straight year. Across the three areas of CS, CE and I combined, the fraction of females among 2020-21 doctoral students was 25.9 percent, versus 24.8 percent in 2019-20. In CS,

Table D1. PhD Production and Pipeline by Department Type

Department Type	# Depts	PhDs Awarded		PhDs Next Year		Passed Qualifier		Passed Thesis (if dept has)		
		#	Avg/ Dept	#	Avg/ Dept	#	Avg/ Dept	#	# Dept	Avg/ Dept
US CS Public	89	1,259	14.1	1,502	16.9	1,657	18.6	1,208	77	15.7
US CS Private	29	432	14.9	528	18.2	490	16.9	261	20	13.1
US CS Total	118	1,691	14.3	2,030	17.2	2,147	18.2	1,469	97	15.1
US CE	3	22	7.3	118	39.3	157	52.3	91	3	30.3
US Info	13	123	9.5	136	10.5	177	13.6	118	12	9.8
Canadian	6	57	9.5	73	12.2	72	12.0	72	3	24.0
Grand Total	140	1,893	13.5	2,357	16.8	2,553	18.2	1,750	115	15.2

Table D2. PhDs Awarded by Gender

	CS		CE		I		Total	
Male	1,233	76.5%	81	80.2%	98	58.7%	1,412	75.1%
Female	376	23.3%	20	19.8%	68	40.7%	464	24.7%
Nonbinary/Other	2	0.1%	0	0.0%	1	0.6%	3	0.2%
Total Known Gender	1,611		101		167		1,879	
Gender Unknown	3		1		10		14	
Grand Total	1,614		102		177		1,893	

Table D3. PhDs Awarded by Ethnicity

	CS		CE		I		Total	
Nonresident Alien	1,024	68.6%	66	72.5%	87	53.7%	1,177	67.4%
Amer Indian or Alaska Native	3	0.2%	0	0.0%	0	0.0%	3	0.2%
Asian	136	9.1%	6	6.6%	13	8.0%	155	8.9%
Black or African-American	19	1.3%	1	1.1%	9	5.6%	29	1.7%
Native Hawaiian/Pac Islander	2	0.1%	0	0.0%	0	0.0%	2	0.1%
White	275	18.4%	15	16.5%	49	30.2%	339	19.4%
Multiracial, not Hispanic	10	0.7%	0	0.0%	2	1.2%	12	0.7%
Hispanic, any race	24	1.6%	3	3.3%	2	1.2%	29	1.7%
Total Residency & Ethnicity Known	1,493		91		162		1,746	
Resident, ethnicity unknown	54		5		2		61	
Residency unknown	67		6		13		86	
Grand Total	1,614		102		177		1,893	

Table D4. Employment of New PhD Recipients By Specialty

	Artificial Intelligence/Machine Learning	Computer-Supported Coop Work	Computing Education	Databases/Information Retrieval	Graphics/Visualization	Hardware/Architecture	High Performance Computing	Human-Computer Interaction	Informatics: Biomedical/Other Science	Information Science	Information Systems	Networks	Operating Systems	Programming Languages/Compilers	Robotics/Vision	Scientific/Numerical Computing	Security/Information Assurance	Social Computing/Social Informatics/	Software Engineering	Theory and Algorithms	Other	Unknown	Total	
North American PhD Granting Depts.																								
Tenure-Track	27	0	13	5	0	6	3	14	3	4	2	4	5	4	4	0	14	7	7	0	9	14	145	10.7%
Researcher	5	0	0	1	1	10	1	1	1	0	2	1	0	0	0	0	3	2	1	0	5	5	39	2.9%
Postdoc	33	0	5	4	4	5	0	15	8	7	1	4	2	12	3	1	8	2	3	13	7	18	155	11.4%
Teaching Faculty	12	0	6	3	3	2	0	3	1	1	0	1	1	1	1	1	1	1	2	4	3	10	57	4.2%
North American, Other Academic																								
Other CS/CE/I Dept	6	0	0	1	3	0	1	3	1	0	1	4	0	0	1	1	3	0	4	1	1	1	32	2.4%
Non-CS/CE/I Dept	1	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	5	0.4%
North American, Non-Academic																								
Industry	195	0	2	37	38	27	9	31	34	4	7	36	25	23	34	3	39	17	62	21	36	85	765	56.3%
Government	2	0	0	0	0	0	4	0	0	0	0	1	0	0	3	0	1	0	2	1	1	7	22	1.6%
Self-Employed	2	0	1	2	0	0	0	0	1	0	0	0	1	1	2	0	2	0	0	0	0	3	15	1.1%
Unemployed	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	3	0.2%
Other	2	0	0	0	0	0	0	0	1	0	0	2	0	1	0	0	0	1	1	0	5	2	15	1.1%
Total Inside North America																								
	285	0	27	55	49	50	19	68	50	17	13	53	34	42	48	6	72	31	82	40	67	145	1,253	92.3%
Outside North America																								
Ten-Track in PhD	3	0	1	1	0	0	0	2	1	1	0	2	1	0	1	0	3	1	2	1	2	6	28	2.1%
Researcher in PhD	0	0	0	0	0	1	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	1	5	0.4%
Postdoc in PhD	1	0	0	2	0	0	1	1	1	0	0	1	0	1	0	1	0	0	0	4	1	3	17	1.3%
Teaching in PhD	0	0	0	0	0	0	0	0	1	0	0	0	1	0	2	0	0	0	0	0	0	1	5	0.4%
Other Academic	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	2	0	5	0.4%
Industry	9	0	1	0	2	1	0	1	1	1	2	2	1	0	1	0	2	3	3	2	2	5	39	2.9%
Government	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1%
Self-Employed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Unemployed	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1%
Other	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	1	4	0.3%
Total Outside NA	13	0	2	4	2	2	2	5	5	2	3	8	3	2	4	1	6	4	5	8	7	17	105	7.7%
Total with Employment Data, Inside North America plus Outside North America																								
	298	0	29	59	51	52	21	73	55	19	16	61	37	44	52	7	78	35	87	48	74	162	1,358	
Employment Type & Location Unknown																								
	64	0	3	11	16	16	5	10	5	11	6	22	15	2	18	6	12	5	15	22	17	254	535	
Grand Total	**362**	**0**	**32**	**70**	**67**	**68**	**26**	**83**	**60**	**30**	**22**	**83**	**52**	**46**	**70**	**13**	**90**	**40**	**102**	**70**	**91**	**416**	**1,893**	

females comprised 24.4 percent of the 2020-21 students currently enrolled, versus 23.4 percent the previous year (Table D7).

Doctoral enrollment diversity by race/ethnicity declined in 2020-21. The overall fraction of doctoral students who were neither Non-resident Aliens, Asian, nor White was 5.3 percent; it was 6.2 percent in 2019-20 although it was only 4.9 percent In 2018-19.

In CS programs, the fraction declined to 5.0 percent from 6.0 percent in 2019-20 and 4.5 percent in 2018-19 (Table D8).

Non-resident Aliens comprise about an equal percentage of the enrolled female and enrolled male CS students. A similar observation was made with respect to CS doctoral degree recipients. In CE, Non-resident Aliens are a somewhat greater

Table D4a. Detail of Industry Employment

	Artificial Intelligence/Machine Learning	Computer-Supported Coop Work	Computing Education	Databases/Information Retrieval	Graphics/Visualization	Hardware/Architecture	High Performance Computing	Human-Computer Interaction	Informatics: Biomedical/Other Science	Information Science	Information Systems	Networks	Operating Systems	Programming Languages/Compilers	Robotics/Vision	Scientific/Numerical Computing	Security/Information Assurance	Social Computing/Social Informatics/	Software Engineering	Theory and Algorithms	Other	Unknown	Total	
Inside North America																								
Research	124	0	1	21	24	17	7	24	18	2	4	19	10	14	23	2	16	14	15	10	14	44	423	55.3%
Non-Research	64	0	1	15	14	9	2	6	11	1	2	15	10	5	8	1	21	3	46	9	17	19	279	36.5%
Postdoctorate	4	0	0	0	0	0	0	1	2	0	0	0	4	2	0	0	1	0	0	1	1	6	22	2.9%
Type Not Specified	3	0	0	1	0	1	0	0	3	1	1	2	1	2	3	0	1	0	1	1	4	16	41	5.4%
Total Inside NA	195	0	2	37	38	27	9	31	34	4	7	36	25	23	34	3	39	17	62	21	36	85	765	
Outside North America																								
Research	7	0	1	0	2	1	0	0	1	0	2	1	1	0	1	0	2	1	2	1	1	2	26	66.7%
Non-Research	2	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	1	2	8	20.5%
Postdoctorate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	2	5.1%
Type Not Specified	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	3	7.7%
Total Outside NA	9	0	1	0	2	1	0	1	1	1	2	2	1	0	1	0	2	3	3	2	2	5	39	

Table D5. New PhD Students by Department Type

	CS				CE				I				Total	
Department Type	**New Admit**	**MS to PhD**	**Total**	**Avg. per Dept.**	**New Admit**	**MS to PhD**	**Total**	**Avg. per Dept.**	**New Admit**	**MS to PhD**	**Total**	**Avg. per Dept.**	**Total**	**Avg. per Dept.**
US CS Public	1,813	190	2,003	22	91	18	109	6.4	106	19	125	12.5	2,237	23.8
US CS Private	838	55	893	27.9	4	4	8	2.7	8	0	8	4	909	28.4
US CS Total	2,651	245	2,896	23.5	95	22	117	5.9	114	19	133	11.1	3,146	25
US CE	0	0	0		107	4	111	27.8	0	0	0		111	27.8
US Information	15	0	15	7.5	0	0	0		201	12	213	14.2	228	15.2
Canadian	128	8	136	19.4	3	0	3	3	0	0	0		139	19.9
Grand Total	2,794	253	3,047	23.1	205	26	231	9.2	315	31	346	12.8	3,624	23.8

Table D5a. New PhD Students from Outside North America

Department Type	CS	CE	I	Total New Outside	Total New	% outside North America
US CS Public	1,244	45	51	1,340	2,237	59.9%
US CS Private	491	2	0	493	909	54.2%
US CS Total	1,735	47	51	1,833	3,146	58.3%
US CE	0	56	0	56	111	50.5%
US Info	10	0	108	118	228	51.8%
Canadian	70	0	0	70	139	50.4%
Grand Total	1,815	103	159	2,077	3,624	57.3%

Table D6. PhD Enrollment by Department Type

Department Type	# Depts	CS		CE		I		Total	
US CS Public	92	10,404	68.0%	768	50.5%	706	43.7%	11,878	64.4%
US CS Private	33	4,089	26.7%	37	2.4%	48	3.0%	4,174	22.6%
US CS Total	125	14,493	94.7%	805	52.9%	754	46.7%	16,052	87.0%
US CE	4	0	0.0%	690	45.3%		0.0%	690	3.7%
US Info	15	106	0.7%	0	0.0%	861	53.3%	967	5.2%
Canadian	6	712	4.7%	27	1.8%	0	0.0%	739	4.0%
Grand Total	150	15,311		1,522		1,615		18,448	

Table D7. PhD Enrollment by Gender

	CS		CE		I		Total	
Male	11,188	75.5%	1,146	79.3%	829	53.3%	13,163	73.8%
Female	3,612	24.4%	299	20.7%	711	45.7%	4,622	25.9%
Nonbinary/Other	24	0.2%	0	0.0%	15	1.0%	39	0.2%
Total Known Gender	14,824		1,445		1,555		17,824	
Gender Unknown	487		77		60		624	
Grand Total	15,311		1,522		1,615		18,448	

Table D8. PhD Enrollment by Ethnicity

	CS		CE		I		Total	
Nonresident Alien	9,040	65.3%	1,030	74.0%	740	47.4%	10,810	64.4%
Amer Indian or Alaska Native	11	0.1%	1	0.1%	4	0.3%	16	0.1%
Asian	1,285	9.3%	73	5.2%	189	12.1%	1,547	9.2%
Black or African-American	223	1.6%	22	1.6%	82	5.3%	327	1.9%
Native Hawaiian/Pac Islander	8	0.1%	2	0.1%	0	0.0%	10	0.1%
White	2,840	20.5%	224	16.1%	470	30.1%	3,534	21.0%
Multiracial, not Hispanic	149	1.1%	15	1.1%	27	1.7%	191	1.1%
Hispanic, any race	287	2.1%	25	1.8%	49	3.1%	361	2.1%
Total Residency & Ethnicity Known	13,843		1,392		1,561		16,796	
Resident, ethnicity unknown	387		46		39		472	
Residency unknown	1,081		84		15		1,180	
Grand Total	15,311		1,522		1,615		18,448	

Table D9. PhDs Awarded by Gender and Ethnicity, From 136 Departments

	CS							CE							I							Ethnicity Totals	
	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N	Total	%
Nonresident Alien	783	241	0	0	68.7%	68.7%	0.0%	52	14	0	0	71.2%	77.8%		56	31	0	0	57.7%	48.4%	0.0%	1,177	67.4%
Amer Indian or Alaska Native	2	1	0	0	0.2%	0.3%	0.0%	0	0	0	0	0.0%	0.0%		0	0	0	0	0.0%	0.0%	0.0%	3	0.2%
Asian	101	34	0	1	8.9%	9.7%	0.0%	5	1	0	0	6.8%	5.6%		6	7	0	0	6.2%	10.9%	0.0%	155	8.9%
Black or African-American	10	8	1	0	0.9%	2.3%	50.0%	1	0	0	0	1.4%	0.0%		2	7	0	0	2.1%	10.9%	0.0%	29	1.7%
Native Hawaiian/ Pac Islander	1	1	0	0	0.1%	0.3%	0.0%	0	0	0	0	0.0%	0.0%		0	0	0	0	0.0%	0.0%	0.0%	2	0.1%
White	213	61	1	0	18.7%	17.4%	50.0%	13	2	0	0	17.8%	11.1%		32	16	1	0	33.0%	25.0%	100.0%	339	19.4%
Multiracial, not Hispanic	8	2	0	0	0.7%	0.6%	0.0%	0	0	0	0	0.0%	0.0%		1	1	0	0	1.0%	1.6%	0.0%	12	0.7%
Hispanic, any race	21	3	0	0	1.8%	0.9%	0.0%	2	1	0	0	2.7%	5.6%		0	2	0	0	0.0%	3.1%	0.0%	29	1.7%
Total Residency & Ethnicity Known	1,139	351	2	1				73	18	0	0				97	64	1	0				1,746	
Resident, ethnicity unknown	41	13	0	0				5	0	0	0				0	2	0	0				61	
Residency unknown	53	12	0	2				3	2	0	1				1	2	0	10				86	
Gender Totals	1,233	376	2	3				81	20	0	1				98	68	1	10				1,893	
%	76.5%	23.3%	0.1%					80.2%	19.8%	0.0%					58.7%	40.7%	0.6%						

* % of M and % of F columns are the percent of that gender who are of the specified ethnicity, of those whose ethnicity is known

Table D10. PhD Enrollment by Gender and Ethnicity, From 150 Departments

	CS							CE							I							Ethnicity Totals	
	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N	Total	%
Nonresident Alien	6,694	2,160	7	179	65.2%	65.3%	41.2%	809	221	0	0	73.3%	76.7%		406	331	3	0	49.9%	48.6%	23.1%	10,810	64.4%
Amer Indian or Alaska Native	9	2	0	0	0.1%	0.1%	0.0%	1	0	0	0	0.1%	0.0%		1	3	0	0	0.1%	0.4%	0.0%	16	0.1%
Asian	873	383	3	26	8.5%	11.6%	17.6%	62	11	0	0	5.6%	3.8%		95	71	1	22	11.7%	10.4%	7.7%	1,547	9.2%
Black or African-American	137	84	0	2	1.3%	2.5%	0.0%	13	9	0	0	1.2%	3.1%		35	42	2	3	4.3%	6.2%	15.4%	327	1.9%
Native Hawaiian/ Pac Islander	5	3	0	0	0.0%	0.1%	0.0%	0	2	0	0	0.0%	0.7%		0	0	0	0	0.0%	0.0%	0.0%	10	0.1%
White	2,216	580	6	38	21.6%	17.5%	35.3%	187	37	0	0	16.9%	12.8%		246	191	7	26	30.3%	28.0%	53.8%	3,534	21.0%
Multiracial, not Hispanic	112	37	0	0	1.1%	1.1%	0.0%	8	7	0	0	0.7%	2.4%		13	14	0	0	1.6%	2.1%	0.0%	191	1.1%
Hispanic, any race	224	59	1	3	2.2%	1.8%	5.9%	24	1	0	0	2.2%	0.3%		17	29	0	3	2.1%	4.3%	0.0%	361	2.1%
Total Residency & Ethnicity Known	10,270	3,308	17	248				1,104	288	0	0				813	681	13	54				16,796	
Resident, ethnicity unknown	269	108	2	8				37	9	0	0				9	22	2	6				472	
Residency unknown	649	196	5	231				5	2	0	77				7	8	0	0				1,180	
Gender Totals	11,188	3,612	24	487				1,146	299	0	77				829	711	15	60				18,448	
%	75.5%	24.4%	0.2%					79.3%	20.7%	0.0%					53.3%	45.7%	1.0%						

* % of M and % of F columns are the percent of that gender who are of the specified ethnicity, of those whose ethnicity is known

Table D11. PhD Enrollment by Gender

	CS		CE		I		Total	
Male	2,243	74.1%	176	77.9%	176	49.6%	2,595	72.0%
Female	762	25.2%	50	22.1%	177	49.9%	989	27.4%
Nonbinary/Other	20	0.7%	0	0.0%	2	0.6%	22	0.6%
Total Known Gender	3,025		226		355		3,606	
Gender Unknown	179		54		56		289	
Grand Total	3,204		280		411		3,895	

Table D12. PhD Enrollment by Ethnicity

	CS		CE		I		Total	
Nonresident Alien	1,801	62.5%	141	65.0%	152	46.8%	2,094	61.2%
Amer Indian or Alaska Native	4	0.1%	1	0.5%	2	0.6%	7	0.2%
Asian	373	13.0%	27	12.4%	33	10.2%	433	12.7%
Black or African-American	60	2.1%	1	0.5%	19	5.8%	80	2.3%
Native Hawaiian/Pac Islander	0	0.0%	0	0.0%	0	0.0%	0	0.0%
White	541	18.8%	38	17.5%	88	27.1%	667	19.5%
Multiracial, not Hispanic	30	1.0%	4	1.8%	16	4.9%	50	1.5%
Hispanic, any race	71	2.5%	5	2.3%	15	4.6%	91	2.7%
Total Residency & Ethnicity Known	2,880		217		325		3,422	
Resident, ethnicity unknown	71		4		6		81	
Residency unknown	253		59		80		392	
Grand Total	3,204		280		411		3,895	

percentage of female students than male students, while in I it is the reverse. White students comprise a lower percentage of enrolled females than enrolled males in all three disciplines, as was the case last year (Table D10).

At U.S. CS departments, the average number of students per department who passed qualifier exams in 2020-21 increased to 18.2 from last year's reported 16.3. Both public and private institutions reported increases after two years of reported declines. The average number per U.S. CS department who passed thesis candidacy exams in 2020-21 (most, but not all, departments have such exams) increased from 13.9 in 2019-20 to 15.1 in 2020-21; here, too, increases were present at both public and private institutions (Table D1).

The number of new Ph.D. students per U.S. CS department increased this year compared with last year's reporting departments for departments at both public and private institutions, the reverse of what happened last year. and in all three disciplines. U.S. I departments also reported an increase, while Canadian departments reported a decline. Among departments that reported both years, the number of new Ph.D. students increased by 14.4 percent overall and 15.4 percent among U.S. CS departments (Tables 1 and D5).

The proportion of new doctoral students from outside North America recovered this year to 57.3 percent from 51.9 percent last year, though it is not at its fall 2019 level of 61.2 percent. Both public and private U.S. CS showed increases from last year, although U.S. CE departments, U.S. I departments, and Canadian showed decreases (Table D5a).

Figure D5 shows a graphical view of the Ph.D. pipeline for U.S. computer science and Canadian departments, the main

Table D13. New PhD Enrollment by Gender and Ethnicity, From 152 Departments

	CS							CE							I							Ethnicity Totals	
	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N	Total	%
Nonresident Alien	1,332	424	7	38	64.4%	59.2%	43.8%	111	30	0	0	65.3%	63.8%		75	76	1	0	47.8%	46.1%	50.0%	2,094	61.2%
Amer Indian or Alaska Native	4	0	0	0	0.2%	0.0%	0.0%	1	0	0	0	0.6%	0.0%		2	0	0	0	1.3%	0.0%	0.0%	7	0.2%
Asian	234	112	4	23	11.3%	15.6%	25.0%	22	5	0	0	12.9%	10.6%		20	13	0	0	12.7%	7.9%	0.0%	433	12.7%
Black or African-American	32	28	0	0	1.5%	3.9%	0.0%	1	0	0	0	0.6%	0.0%		6	13	0	0	3.8%	7.9%	0.0%	80	2.3%
Native Hawaiian/ Pac Islander	0	0	0	0	0.0%	0.0%	0.0%	0	0	0	0	0.0%	0.0%		0	0	0	0	0.0%	0.0%	0.0%	0	0.0%
White	402	121	2	16	19.4%	16.9%	12.5%	31	7	0	0	18.2%	14.9%		44	43	1	0	28.0%	26.1%	50.0%	667	19.5%
Multiracial, not Hispanic	14	16	0	0	0.7%	2.2%	0.0%	1	3	0	0	0.6%	6.4%		5	11	0	0	3.2%	6.7%	0.0%	50	1.5%
Hispanic, any race	51	15	3	2	2.5%	2.1%	18.8%	3	2	0	0	1.8%	4.3%		5	9	0	1	3.2%	5.5%	0.0%	91	2.7%
Total Residency & Ethnicity Known	2,069	716	16	79				170	47	0	0				157	165	2	1				3,422	
Resident, ethnicity unknown	52	15	4	0				4	0	0	0				2	4	0	0				81	
Residency unknown	122	31	0	100				2	3	0	54				17	8	0	55				392	
Gender Totals	2,243	762	20	179				176	50	0	54				176	177	2	56				3,895	
%	74.1%	25.2%	0.7%					77.9%	22.1%	0.0%					49.6%	49.9%	0.6%						

* % of M and % of F columns are the percent of that gender who are of the specified ethnicity, of those whose ethnicity is known

producers of CS doctoral degrees. The data in this graph are normalized by the number of reporting departments. The graph offsets the qualifier data by two years from the data for new students, and offsets the graduation data by five years from the data for new students. These data have been useful in estimating the timing of changes in production rates. The graph predicts steady to slightly increased Ph.D. production next year. Departments are forecasting a larger increase in production during 2020-21 (Table D1). Based on past experience, the amount of the increase tends to be less than departments estimate.

Ph.D. Employment

Figure D6 shows the employment trend of new Ph.D.s in academia and industry within North America, those taking employment outside of North America, and those going to academia in North America who took positions in departments other than Ph.D.-granting CS and CE departments. Table D4 shows a more detailed breakdown of the employment data for new Ph.D.s. The percentage of new Ph.D.s who took positions in North American industry was 56.3 percent, virtually unchanged from last year. Among those doctoral graduates who went to North American industry and for whom the type of industry position was known, about 58 percent took research positions (Table D4a), compared with 57 percent who did so last year. This year, definitive data was provided for over 94 percent of the graduates who went to North American industry; this is slightly above last year's percentage.

Among those 2020-21 Ph.D. graduates for whom employment data was available, the percentage who took North American academic jobs in 2021-22 (32.0) exceeded that reported for 2020-21 (30.0). Among those graduates taking academic positions in North America, the percentage who did not go to a doctoral-granting computing department was 8.5, compared to 6.3 reported in last year's survey. This number has oscillated for the last several years.

Among those whose employment is known, 7.7 percent of Ph.D. graduates reported taking positions outside of North America, down from 10.2 percent reported last year that was the highest percentage in nearly a decade. A much higher percentage of these graduates went to an industry position than did so last year (37 vs 21 percent), while a smaller percentage (31 vs 39 percent) went to some kind a tenure-track or research position in a doctoral-granting institution. Definitive data was provided for 92 percent of the graduates who went to non-North American industry positions, compared with 86 percent reported last year.

When academic and industry postdocs are combined, the result is that 14.4 percent of 2020-21 doctoral graduates whose employment was known took some type of postdoctoral position. Last year, the reported percentage was 13.2. Approximately twelve percent of these were industry postdocs, versus eight percent last year.

Of those doctoral graduates for whom employment information was known, four reported as unemployed. However, 28.3 percent of new Ph.D.s' employment status was unknown, lower than the 31.5 percent reported last year. The lack of information about the employment of more than one in four graduates may skew the real overall percentages for certain employment categories.

Table D4 also indicates the areas of specialty of new Ph.D.s. artificial intelligence/machine learning continues to be by far the most popular area, comprising 1/4 of all doctoral degrees awarded for which the area was known. Last year, AI had nearly 19 percent, so this area is not only huge, but has grown rapidly. Software engineering, security/information assurance, human-computer interaction and networking rounded out the top five among those areas that were defined. Theory/algorithms dropped out of the top five this year. Approximately 1/4 of the Ph.D.s are categorized into the area "unknown", higher than last year. Another six percent were categorized as "other", about the same as third-place security/information assurance.

Master's and Bachelor's Degree Production and Enrollments

This section reports data about enrollment and degree production for master's and bachelor's programs in the doctoral-granting departments. Although the absolute number of degrees

Figure D1. PhD Production

CRA Taulbee Survey 2021

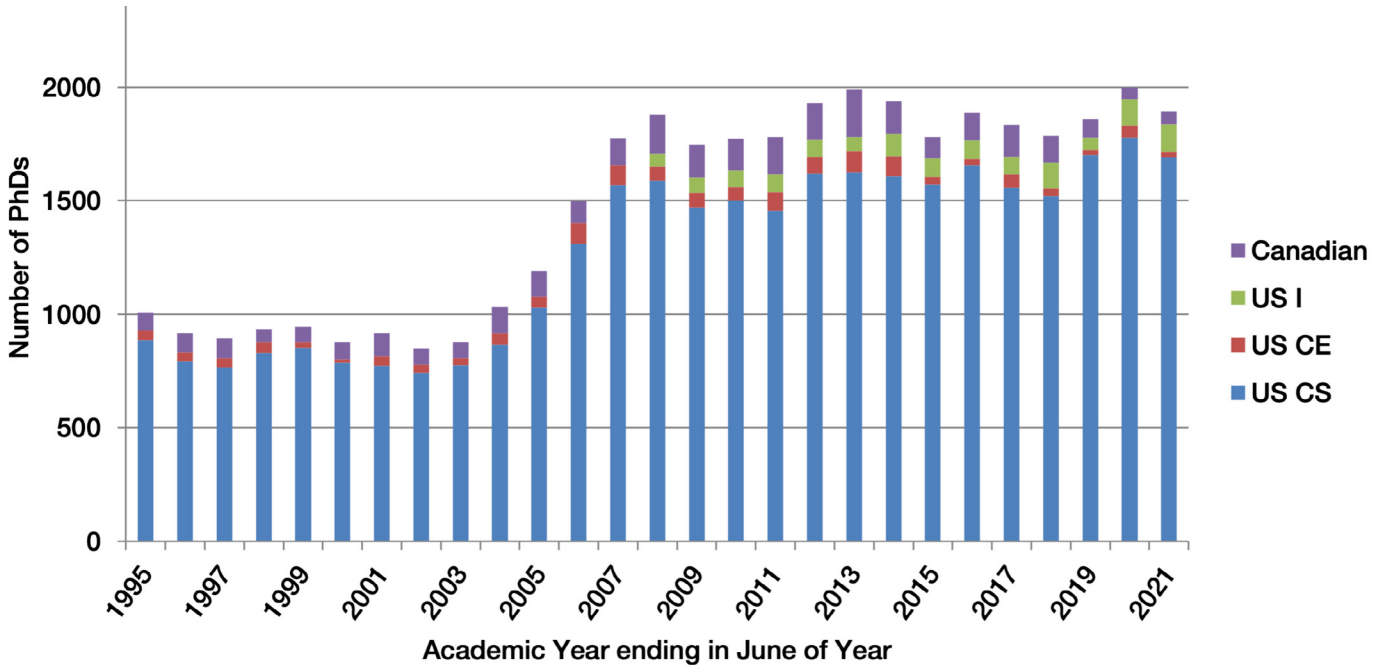


Figure D2. Nonresident Aliens as Fraction of PhD Enrollments

CRA Taulbee Survey 2021

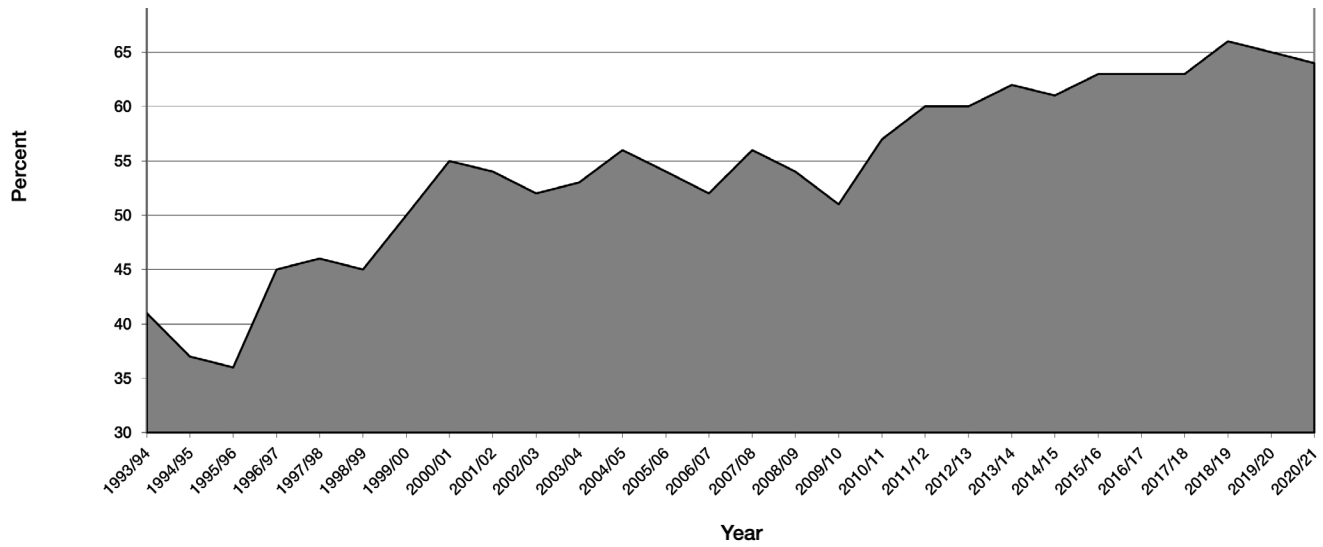


Figure D3. PhD Degrees Granted by Tenure-Track Size

CRA Taulbee Survey 2021

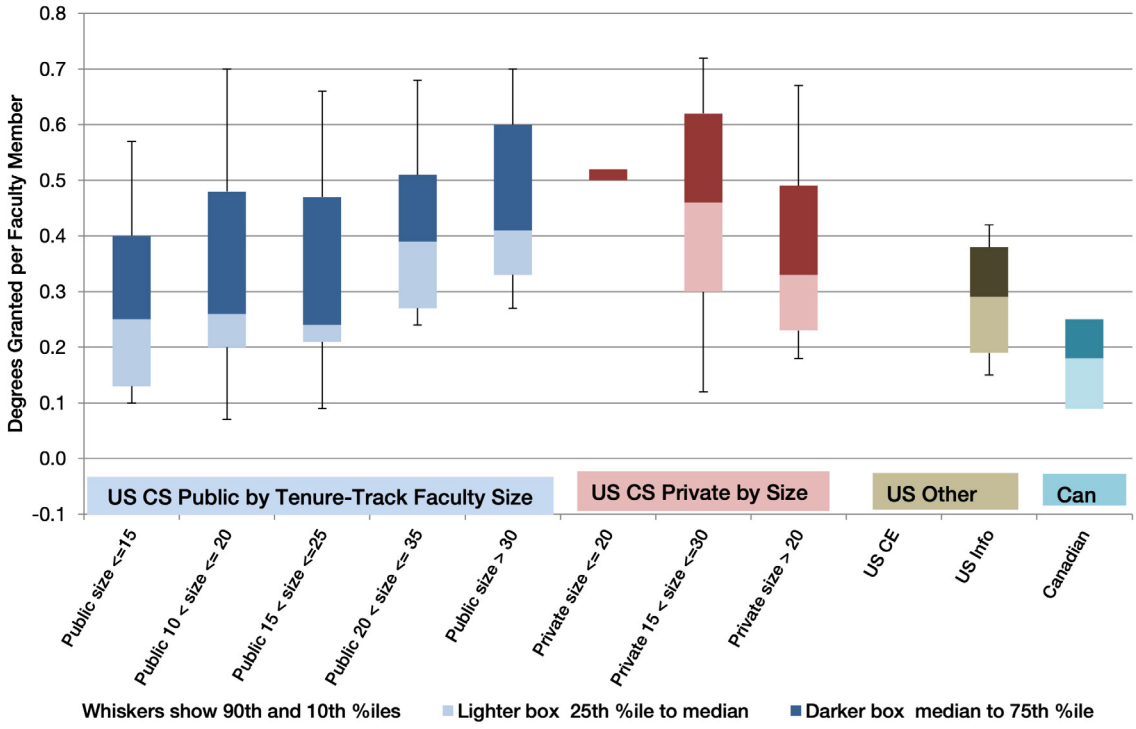


Figure D4. PhD Enrollment Normalized by Tenure-Track Size

CRA Taulbee Survey 2021

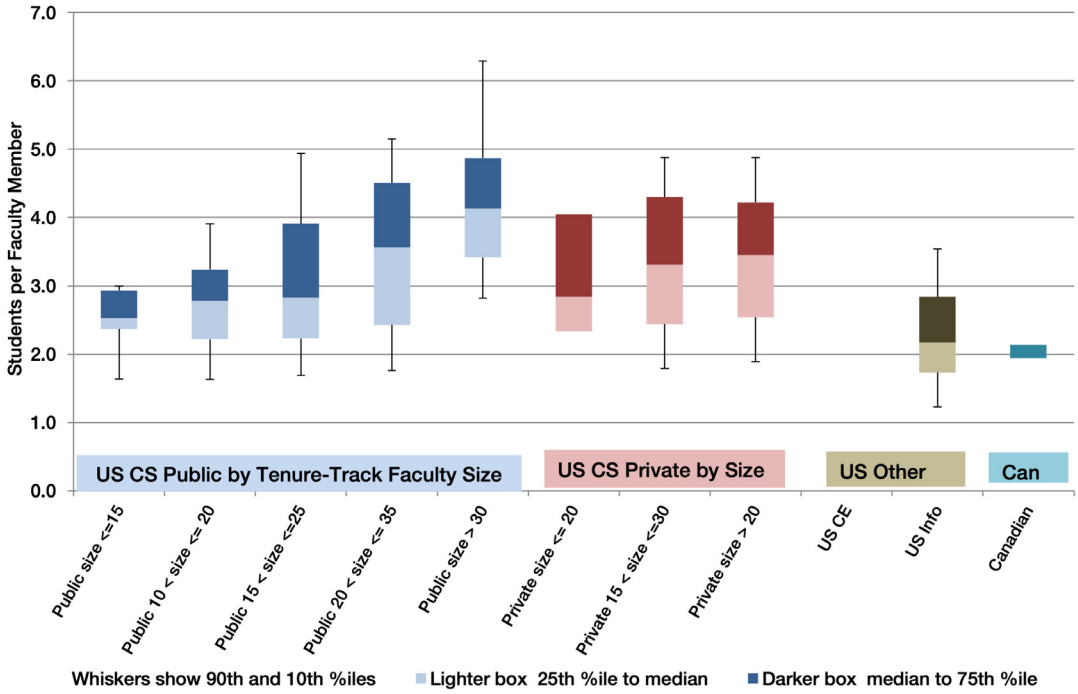


Figure D5. CS Pipeline corrected for year of entry

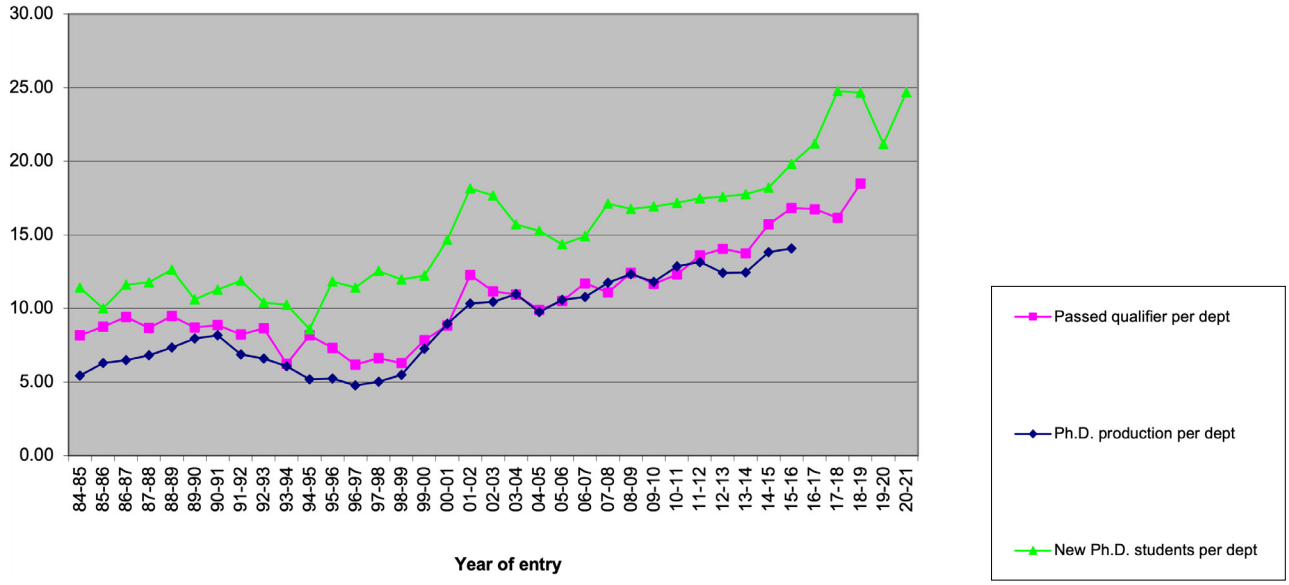
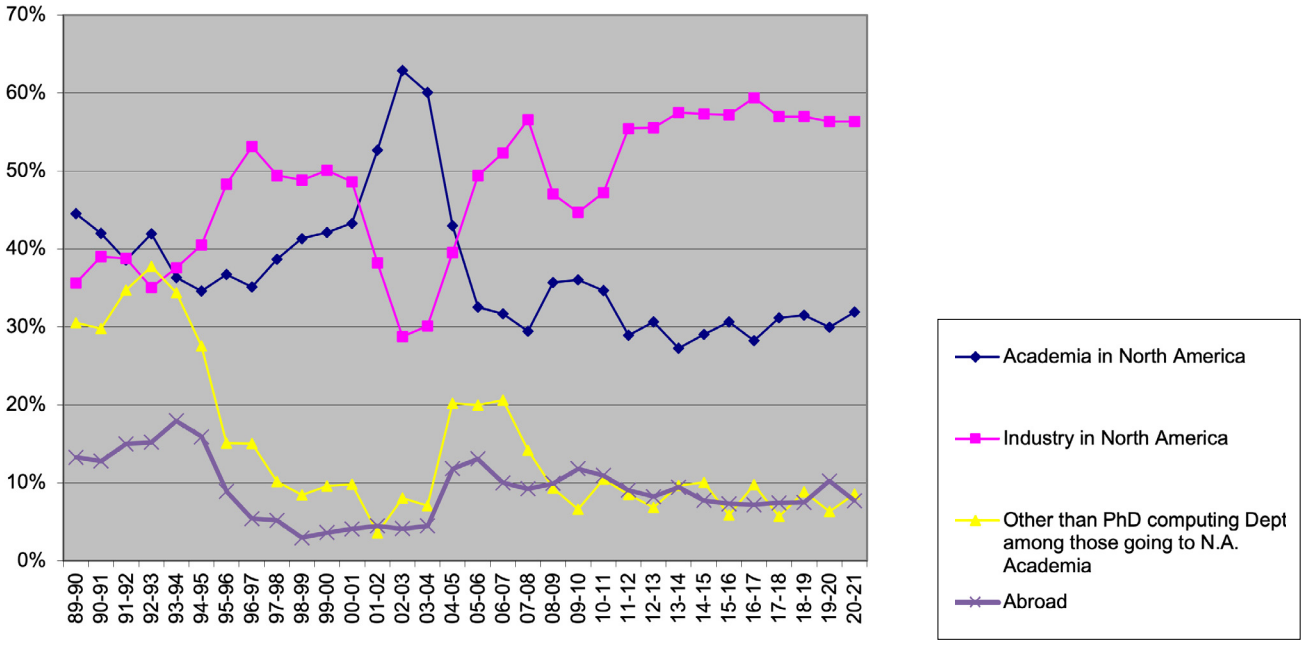


Figure D6. Employment Trends for New Ph.D.s



and enrolled students reported herein only reflect departments that offer the doctoral degree, the trends observed in the master's and bachelor's data from these departments tend to strongly reflect trends in the larger population of programs that offer such degrees.

Master's

(Tables M1-M8; Figures M1-M2)

On a per department basis, 2020-21 overall master's degree production in U.S. CS departments rose by 13.2 percent compared with 2019-20. If only CS master's production is considered, the increase is 14.0 percent. The increases are attributable to public institutions, which reported an overall 20.7 percent increase and a 20.6 percent Increase in CS master's, while private institutions reported a decline of 2.7 percent in overall production and 2.6 percent in CS master's production. The other department types also showed declines from last year's overall production per department, but these other categories have smaller numbers of departments reporting and therefore are more influenced by the specific departments reporting in a given year. This is particularly true for Canadian and CE departments (Table M1).

The proportion of female graduates among CS master's degree recipients increased from 26.6 percent to 27.8 percent. Among CE graduates, 25.7 percent were female, down from 29.9 percent, and the I area continued to have more female than male graduates among those whose gender was reported (51.6 percent, up from 50.7 percent in last year's report). Aggregating all areas, the percentage of master's degree graduates who were female increased slightly, from 31.4 to 31.7 percent (Table M2).

In CS, the proportion of master's degrees that went to Non-resident Aliens declined again, to 65.2 percent compared with 66.8 percent in 2019-20. However, the proportion of degrees to Non-resident Aliens increased in the I area, from 41.0 percent to 44.3 percent. The CE area statistics can be volatile due to the smaller number of units reporting; however, the proportion of CE degrees going to Non-resident Aliens decreased only slightly, from 78.4 to 76.0 percent. The aggregate percentage over all three areas was 62.2 percent versus 62.3 percent reported last year. The percentage of CS master's recipients among the combined American Indian/Alaska Native, Black/African-American, Native Hawaiian/Pacific Islander, Hispanic, and Multiracial categories was 5.1 percent versus 5.0 percent in 2019-20 (Table M3).

Table M1. Master's Degrees Awarded by Department Type

Department Type	# Depts	CS		CE		I		Total	
US CS Public	94	10,651	70.7%	362	40.5%	855	26.5%	11,868	61.9%
US CS Private	29	3,996	26.5%	46	5.2%	429	13.3%	4,471	23.3%
US CS Total	123	14,647	97.2%	408	45.7%	1,284	39.8%	16,339	85.2%
US CE	4		0.0%	485	54.3%		0.0%	485	2.5%
US Info	13	22	0.1%	0	0.0%	1,941	60.2%	1,963	10.2%
Canadian	6	399	2.6%		0.0%		0.0%	399	2.1%
Grand Total	146	15,068		893		3,225		19,186	

Table M2. Master's Degrees Awarded by Gender

	CS		CE		I		Total	
Male	10,422	71.3%	637	74.3%	1,483	48.3%	12,542	67.6%
Female	4,070	27.8%	220	25.7%	1,584	51.6%	5,874	31.7%
Nonbinary/Other	132	0.9%	0	0.0%	2	0.1%	134	0.7%
Total Known Gender	14,624		857		3,069		18,550	
Gender Unknown	444		36		156		636	
Grand Total	15,068		893		3,225		19,186	

Table M3. Master's Degrees Awarded by Ethnicity

	CS		CE		I		Total	
Nonresident Alien	9,032	65.2%	629	76.0%	1,326	44.3%	10,987	62.2%
Amer Indian or Alaska Native	12	0.1%	0	0.0%	3	0.1%	15	0.1%
Asian	1,677	12.1%	46	5.6%	385	12.9%	2,108	11.9%
Black or African-American	184	1.3%	18	2.2%	142	4.7%	344	1.9%
Native Hawaiian/Pac Islander	6	0.0%	1	0.1%	0	0.0%	7	0.0%
White	2,421	17.5%	95	11.5%	952	31.8%	3,468	19.6%
Multiracial, not Hispanic	166	1.2%	13	1.6%	56	1.9%	235	1.3%
Hispanic, any race	349	2.5%	26	3.1%	127	4.2%	502	2.8%
Total Residency & Ethnicity Known	13,847		828		2,991		17,666	
Resident, ethnicity unknown	520		18		87		625	
Residency unknown	701		47		147		895	
Grand Total	15,068		893		3,225		19,186	

Table M4. Master's Degrees Expected Next Year by Department Type

Department Type	# Depts	CS		CE		I		Total	
US CS Public	84	8,586	70.7%	151	32.8%	499	16.1%	9,236	58.8%
US CS Private	27	3,201	26.3%	12	2.6%	322	10.4%	3,535	22.5%
US CS Total	111	11,787	97.0%	163	35.4%	821	26.4%	12,771	81.2%
US CE	3		0.0%	298	64.6%		0.0%	298	1.9%
US Info	15	63	0.5%	0	0.0%	2,288	73.6%	2,351	15.0%
Canadian	6	300	2.5%	0	0.0%	0	0.0%	300	1.9%
Grand Total	135	12,150		461		3,109		15,720	

Table M5. New Master's Students by Department Type

Department Type	CS			CE			I			Total			Outside North America	
	Total	# Depts	Avg. per Dept.	Total	# Depts	Avg. per Dept.	Total	# Depts	Avg. per Dept.	Total	# Depts	Avg. per Dept.	# Depts	%
US CS Public	13,253	94	141	358	18	19.9	692	15	46.1	14,303	95	150.6	9,614	67.2%
US CS Private	5,205	30	173.5	27	2	13.5	449	3	149.7	5,681	30	189.4	3,785	66.6%
US CS Total	18,458	124	148.9	385	20	19.3	1,141	18	63.4	19,984	125	159.9	13,399	67.0%
US CE		0		295	3	98.3		0		295	3	98.3	191	64.7%
US Info	130	2	65	0	0		2,792	15	186.1	2,922	15	194.8	1,371	46.9%
Canadian	546	7	78	36	1	36	0	0		582	7	83.1	282	48.5%
Grand Total	19,134	133	143.9	716	24	29.8	3,933	33	119.2	23,783	150	158.6	15,243	64.1%

Table M6. Total Master's Students by Department Type

Department Type	CS			CE			I			Total		
	Total	# Depts	Avg. per Dept.	Total	# Depts	Avg. per Dept.	Total	# Depts	Avg. per Dept.	Total	# Depts	Avg. per Dept.
US CS Public	28,880	91	317.4	694	20	34.7	2,145	15	143	31,719	92	344.8
US CS Private	9,705	28	346.6	77	2	38.5	862	3	287.3	10,644	28	380.1
US CS Total	38,585	119	324.2	771	22	35	3,007	18	167.1	42,363	120	353
US CE		0		987	4	246.8		0		987	4	246.8
US Info	166	2	83	0	0		5,918	14	422.7	6,084	14	434.6
Canadian	1,195	7	170.7	105	1	105		0		1,300	7	185.7
Grand Total	39,946	128	312.1	1,863	27	69	8,925	32	278.9	50,734	145	349.9

Non-resident Aliens again comprised a much larger proportion of female CS and CE degree recipients than male CS and CE degree recipients, while larger percentage of male CS and CE degree recipients than female CS and CE degree recipients were White (Table M7). In the I area, Non-resident Aliens again comprised a larger percentage of male master's graduates than female master's graduates, while a smaller percentage of male master's graduates than female master's graduates were White. These relationships have existed for several years, and are likely to continue into the near future based on the current enrollment breakdown by gender and ethnicity (Table M8).

The average number of new master's students enrolled in U.S. CS departments rose substantially, from 99.5 to 159.9. This increase more than counters the substantial drop last year, and is more than 30% greater than the average two years ago. Both public and private institutions showed a healthy Increase, but the increase was far greater at public institutions. This increase is entirely due to students who are from outside North America, which increased 51 percent this year; total new student enrollment from within North America actually dropped by 10 percent, probably impacted by the six percent drop in the number of institutions reporting this year. Two-thirds of the new U.S. CS students are from outside North America (Table M5).

U.S. Information departments and Canadian departments also experienced a sizeable increase in the fraction of new master's students from outside North America. in U.S. I departments, the percentage rose to 46.9 percent from 25.8 percent, while in Canadian departments, it rose to 48.5 percent from 30.6 percent.

Bachelor's

(Tables 1, B1-B8; Figures B1-B4)

After six straight years of double-digit percentage growth in bachelor's degree production, the increase in total degrees produced during 2020-21 across the three computing areas was just 1.7 percent. The increase in CS degrees produced was 3.8 percent. On a per-department basis, total degree production rose overall by 7.4 percent across all department types and 8.8 percent in U.S. CS departments. Total computer science degree production in U.S. CS departments rose 3.5 percent, and 10.2 percent per department. When considering only those departments that reported both years, the increase in total degree production across the CS, CE and I areas was

Table M7. Master's Degrees Awarded by Gender and Ethnicity, From 146 Departments

	CS							CE							I							Ethnicity Totals	
	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N	Total	%
Nonresident Alien	6,288	2,640	81	23	63.9%	68.6%	64.8%	449	180	0	0	72.9%	84.9%		670	656	0	0	46.8%	42.4%	0.0%	10,987	62.2%
Amer Indian or Alaska Native	7	5	0	0	0.1%	0.1%	0.0%	0	0	0	0	0.0%	0.0%		3	0	0	0	0.2%	0.0%	0.0%	15	0.1%
Asian	1,121	531	24	1	11.4%	13.8%	19.2%	33	13	0	0	5.4%	6.1%		179	203	1	2	12.5%	13.1%	50.0%	2,108	11.9%
Black or African-American	136	48	0	0	1.4%	1.2%	0.0%	14	4	0	0	2.3%	1.9%		67	75	0	0	4.7%	4.9%	0.0%	344	1.9%
Native Hawaiian/ Pac Islander	4	2	0	0	0.0%	0.1%	0.0%	1	0	0	0	0.2%	0.0%		0	0	0	0	0.0%	0.0%	0.0%	7	0.0%
White	1,916	485	19	1	19.5%	12.6%	15.2%	84	11	0	0	13.6%	5.2%		423	521	0	8	29.5%	33.7%	0.0%	3,468	19.6%
Multiracial, not Hispanic	115	51	0	0	1.2%	1.3%	0.0%	12	1	0	0	1.9%	0.5%		28	27	1	0	2.0%	1.7%	50.0%	235	1.3%
Hispanic, any race	260	88	1	0	2.6%	2.3%	0.8%	23	3	0	0	3.7%	1.4%		63	64	0	0	4.4%	4.1%	0.0%	502	2.8%
Total Residency & Ethnicity Known	9,847	3,850	125	25				616	212	0	0				1,433	1,546	2	10				17,666	
Resident, ethnicity unknown	323	124	7	66				13	5	0	0				49	38	0	0				625	
Residency unknown	252	96	0	353				8	3	0	36				1	0	0	146				895	
Gender Totals	10,422	4,070	132	444				637	220	0	36				1,483	1,584	2	156				19,186	
%	71.3%	27.8%	0.9%					74.3%	25.7%	0.0%					48.3%	51.6%	0.1%						

* % of M and % of F columns are the percent of that gender who are of the specified ethnicity, of those whose ethnicity is known

Table M8. Master's Enrollment by Gender and Ethnicity, From 145 Departments

	CS							CE							I							Ethnicity Totals	
	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N	Total	%
Nonresident Alien	13,590	5,921	6	74	50.6%	64.6%	60.0%	898	370	0	2	71.4%	81.7%		1,802	1,404	2	1	40.4%	33.6%	40.0%	24,070	51.7%
Amer Indian or Alaska Native	22	4	0	0	0.1%	0.0%	0.0%	0	1	0	0	0.0%	0.2%		8	9	0	1	0.2%	0.2%	0.0%	45	0.1%
Asian	4,120	1,529	0	15	15.3%	16.7%	0.0%	97	38	0	0	7.7%	8.4%		626	551	0	2	14.0%	13.2%	0.0%	6,978	15.0%
Black or African-American	563	198	0	1	2.1%	2.2%	0.0%	27	8	0	0	2.1%	1.8%		229	238	1	2	5.1%	5.7%	20.0%	1,267	2.7%
Native Hawaiian/ Pac Islander	15	2	0	0	0.1%	0.0%	0.0%	2	0	0	0	0.2%	0.0%		18	6	0	0	0.4%	0.1%	0.0%	43	0.1%
White	6,983	1,165	4	47	26.0%	12.7%	40.0%	173	28	0	0	13.8%	6.2%		1,456	1,635	2	22	32.6%	39.1%	40.0%	11,515	24.7%
Multiracial, not Hispanic	408	112	0	3	1.5%	1.2%	0.0%	19	4	0	0	1.5%	0.9%		75	104	0	0	1.7%	2.5%	0.0%	725	1.6%
Hispanic, any race	1,180	231	0	6	4.4%	2.5%	0.0%	41	4	0	0	3.3%	0.9%		246	232	0	1	5.5%	5.6%	0.0%	1,941	4.2%
Total Residency & Ethnicity Known	26,881	9,162	10	146				1,257	453	0	2				4,460	4,179	5	29				46,584	
Resident, ethnicity unknown	1,091	406	8	6				9	5	0	0				108	75	0	1				1,709	
Residency unknown	1,227	448	1	560				1	0	0	136				42	26	0	0				2,441	
Gender Totals	29,199	10,016	19	712				1,267	458	0	138				4,610	4,280	5	30				50,734	
%	74.4%	25.5%	0.0%					73.4%	26.6%	0.0%					51.8%	48.1%	0.1%						

* % of M and % of F columns are the percent of that gender who are of the specified ethnicity, of those whose ethnicity is known

CRA
Computing Research Association

Figure M1 . Master's Degrees Granted by Tenure-Track Size

CRA Taulbee Survey 2021

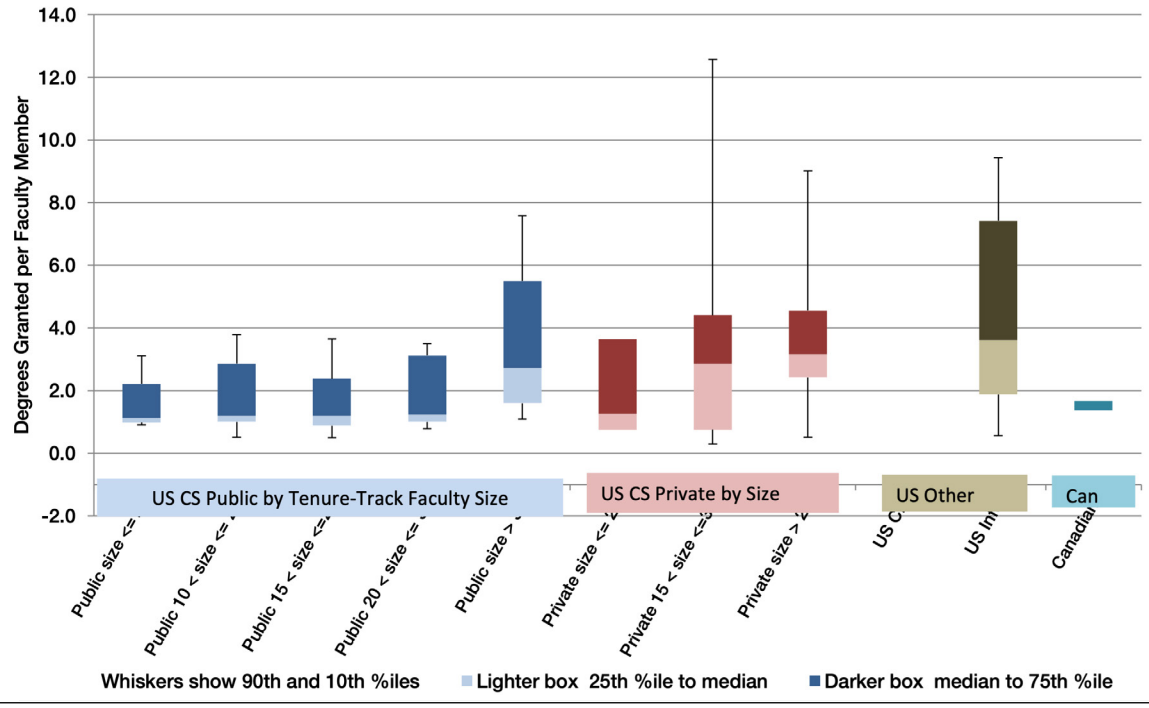
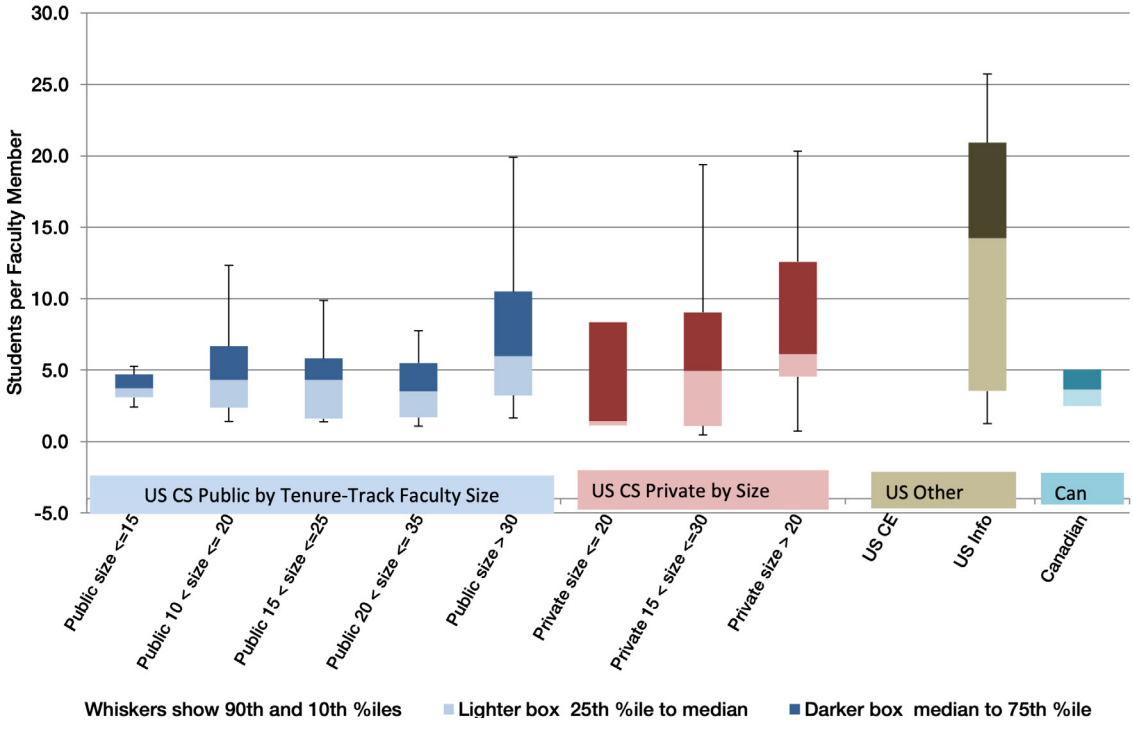


Figure M2. Master's Enrollment Normalized by Tenure-Track Size

CRA Taulbee Survey 2021



5.2 percent among all departments and 6.4 percent among U.S. CS departments (Tables 1 and B1). The more modest increases observed from this year's reporting were predicted last year.

Figure B1 shows the trend in total CS and CE bachelor's degree production since 1995 for all departments reporting to the Taulbee Survey. Based on department forecasts (Table B4), CS bachelor's degree production in 2021-22 seems likely to be near its peak level from 2020-21. However, it should be noted that actual bachelor's degree production exceeded last year's departmental projections.

Gender diversity among bachelor's graduates improved this year, both in CS and when aggregated over all three disciplines. Among CS graduates whose gender was known, 22.3 percent were female in 2020-21 compared with20.6 percent in 2019-20.

Table B1. Bachelor's Degrees Awarded by Department Type

Department Type	# Depts	CS		CE		I		Total	
US CS Public	92	24,409	73.8%	1,878	63.8%	1,972	43.3%	28,259	69.7%
US CS Private	30	6,005	18.2%	90	3.1%	336	7.4%	6,431	15.9%
US CS Total	122	30,414	92.0%	1,968	66.9%	2,308	50.7%	34,690	85.5%
US CE	4		0.0%	780	26.5%		0.0%	780	1.9%
US Info	12	248	0.8%	0	0.0%	2,243	49.3%	2,491	6.1%
Canadian	6	2,397	7.3%	194	6.6%		0.0%	2,591	6.4%
Grand Total	144	33,059		2,942		4,551		40,552	

Table B2. Bachelor's Degrees Awarded by Gender

	CS		CE		I		Total	
Male	24,901	77.7%	2,357	82.9%	3,222	70.9%	30,480	77.3%
Female	7,144	22.3%	482	17.0%	1,321	29.1%	8,947	22.7%
Nonbinary/Other	13	0.0%	4	0.1%	0	0.0%	17	0.0%
Total Known Gender	32,058		2,843		4,543		39,444	
Gender Unknown	1,001		99		8		1,108	
Grand Total	33,059		2,942		4,551		40,552	

Table B3. Bachelor's Degrees Awarded by Ethnicity

	CS		CE		I		Total	
Nonresident Alien	4,483	16.3%	464	17.9%	415	9.4%	5,362	15.6%
Amer Indian or Alaska Native	50	0.2%	1	0.0%	7	0.2%	58	0.2%
Asian	7,808	28.4%	654	25.3%	939	21.2%	9,401	27.3%
Black or African-American	885	3.2%	91	3.5%	372	8.4%	1,348	3.9%
Native Hawaiian/Pac Islander	54	0.2%	2	0.1%	6	0.1%	62	0.2%
White	10,725	39.1%	1,038	40.1%	1,948	44.0%	13,711	39.8%
Multiracial, not Hispanic	943	3.4%	91	3.5%	186	4.2%	1,220	3.5%
Hispanic, any race	2,507	9.1%	246	9.5%	555	12.5%	3,308	9.6%
Total Residency & Ethnicity Known	27,455		2,587		4,428		34,470	
Resident, ethnicity unknown	982		86		100		1,168	
Residency unknown	4,622		269		23		4,914	
Grand Total	33,059		2,942		4,551		40,552	

Table B4. Bachelor's Degrees Expected Next Year by Department Type

Department Type	# Depts	CS		CE		I		Total	
US CS Public	90	22,838	70.4%	1,656	56.7%	1,570	34.4%	26,064	65.3%
US CS Private	26	5,988	18.5%	96	3.3%	293	6.4%	6,377	16.0%
US CS Total	116	28,826	88.9%	1,752	60.0%	1,863	40.8%	32,441	81.3%
US CE	3		0.0%	917	31.4%		0.0%	917	2.3%
US Info	14	232	0.7%	0	0.0%	2,701	59.2%	2,933	7.3%
Canadian	6	3,366	10.4%	252	8.6%	0	0.0%	3,618	9.1%
Grand Total	139	32,424		2,921		4,564		39,909	

Table B5. New Bachelor's Students by Department Type

	CS				CE				I				Total	
Department Type	Major	Pre-Major	# Depts	Avg. Major /Dept	Total	Pre-Major	# Depts	Avg. Major /Dept	Total	Pre-Major	# Depts	Avg. Major /Dept	Total Major	Avg. Major /Dept
US CS Public	24,939	12,598	87	286.7	1,862	1,376	27	69	1,169	123	20	58.5	27,970	317.8
US CS Private	5,495	2,007	24	229	81	26	3	27	532	42	4	133	6,108	254.5
US CS Total	30,434	14,605	111	274.2	1,943	1,402	30	64.8	1,701	165	24	70.9	34,078	304.3
US CE	0	0	0		700	219	3	233.3	0	0	0		700	233.3
US Info	365	276	2	182.5	0	0	0		2,366	769	14	169	2,731	195.1
Canadian	2,322	487	5	464.4	34	0	1	34	0	0	0		2,356	471.2
Grand Total	33,121	15,368	118	280.7	2,677	1,621	34	78.7	4,067	934	38	107	39,865	297.5

Table B6. Total Bachelor's Enrollment by Department Type

	CS				CE				I				Total	
Department Type	Major	Pre-Major	# Depts	Avg. Major /Dept	Total	Pre-Major	# Depts	Avg. Major /Dept	Total	Pre-Major	# Dept	Avg. Major /Dept	Total Major	Avg. Major / Dept
US CS Public	112,705	20,828	94	1,199	9,717	1,830	32	303.7	8,550	637	21	407.1	130,972	1,378.7
US CS Private	23,287	4,103	29	803	398	47	4	99.5	1,927	42	4	481.8	25,612	883.2
US CS Total	135,992	24,931	123	1,105.6	10,115	1,877	36	281	10,477	679	25	419.1	156,584	1,262.8
US CE	0	0	0		2,687	302	4	671.8	0	0	0		2,687	671.8
US Info	1,520	492	2	760	0	0	0		9,963	1,246	13	766.4	11,483	883.3
Canadian	11,052	1,841	6	1,842	1,004	1,004	1	1,004		0	0		12,056	2,009.3
Grand Total	148,564	27,264	131	1,134.1	13,806	3,183	41	336.7	20,440	1,925	38	537.9	182,810	1,243.6

Among all graduates whose gender was known, 22.7 percent were female compared with 21.5 percent in 2019-20. The percentage of I graduates who were female dropped slightly, from 29.4 percent to 29.1 percent, and the percentage of CE bachelor's graduates who were female increased from 16.6 percent to 17.0 percent. Both the CS and I areas had many fewer graduates whose gender is unknown than was the case last year, while the CE area had more such graduates (Table B2).

The percentage of CS bachelor's graduates who are White once again declined, from 40.7 percent in 2019-20 to 39.1 percent in 2020-21. The percentage awarded to Non-resident Aliens rose from 15.2 to 16.3 percent. The percentage awarded to Asians dropped slightly, from 28.8 to 28.4 percent. All other ethnicities combined comprise 16.1 percent of those for whom ethnicity is known, up from 15.4 percent last year. Hispanics again make up the largest share of these other ethnicities at 9.1 percent, up from 8.5 percent last year.

In aggregate across the three areas of computing, 39.8 percent of the graduates were White, 27.3 percent Asian, 15.6 percent Non-resident Aliens, and 17.4 percent all other ethnicity categories combined. I programs continue to be the most diverse with respect to race/ethnicity; In these programs the race/ethnicity categories other than White, Asian, and Non-resident Alien accounted for 25.4 percent of the graduates whose race/ethnicity is known, higher than last year's 23.8 percent (Table B3).

The number of new undergraduate computing majors reported across the three disciplines held steady in 2021-22. The total count fell by 0.6 percent, while overall new majors per department increased by 0.9 percent. However, this result is due to a large decrease in the number of new majors at Canadian departments, and the Canadian results are strongly influenced by changes in the specific departments that report. In U.S. CS departments, the overall count of majors across the three disciplines increased by 5.9 percent, and on a per department basis, new majors increased by 7.8 percent. Public institutions accounted for the preponderance of the growth, with a 23.6 percent increase in both overall and per-department counts. Private institutions grew by 2.6 percent in overall count and 6.8 percent on a per-department basis. In the I area, the overall count of new majors across all department types increased 26.9 percent, and the majors per department increased 17.9 percent. This is the second consecutive year of very large increases In the I area.

In CS, the overall count of new majors across all department types declined by 3.7 percent, but new majors per department declined by only 0.4 percent. At U.S. CS departments, the overall count of new CS majors increased by 6.5 percent and increased by 8.4 percent on a per-department basis. Again, public universities accounted for all of the CS growth, at 10.2 percent in overall count and 11.5 percent per department. Private institution reports showed an overall decline of 7.7 percent and a 3.9 percent decline per department (Table B5).

When only departments reporting both this year and last year are considered, the count of new majors increased by 9.4 percent across all departments, and 10.2 percent at U.S. CS departments, reversing two years of decreases among departments reporting in consecutive years (Table 1). Figure B2 illustrates the trend in the total number of newly declared computing undergraduate majors as reported in the Taulbee Survey.

Total enrollment in the major generally exhibited continued growth, when normalized for the number of departments reporting. The exception was in I departments, where the number of majors in CS, CE, and I combined declined by 0.7 percent both in total count and per department. At U.S. CS departments, the number of majors in CS, CE, and I combined increased 4.2 percent in total count and 7.5 percent per department. U.S. CS departments at public institutions showed a 7.7 percent increase per department, while the increase at private institutions was 4.4 percent. Canadian departments reported an increase of 3.3 percent per department, and CE departments showed a 13.1 percent increase per department; however, there are few departments in each of these two department types. In aggregate across all department types, total enrollment across the three computing areas increased 5.9 percent per department (Table B6). When only departments reporting both years are considered, the increases in enrollment per department are 5.1 percent when all departments are considered, and 5.6 percent when only U.S. CS departments are considered (Table 1).

Looking only at CS enrollment, the increase in majors per department reporting is 6.3 percent for all departments combined, and 8.8 percent for U.S. CS departments. The U.S. CS growth this year is at departments in both public and private institutions, at 8.8 and 7.2 percent, respectively (Table B6).

Per-department averages smooth out comparisons from year to year when there are differences in the number of reporting departments, but these averages include both very large and very small departments. Figures B3 and B4 show the distribution of number of degrees awarded (Figure B3) and total enrollment (Figure B4) per tenured or tenure-track faculty member, in department size groupings for the U.S. CS departments. For degrees awarded, the average per tenure-track faculty member increases somewhat with department size for public institutions but not for private. For enrollment, neither public nor private institutions show a clear relationship between enrollment per tenure-track faculty member and faculty size.

Table B7. Bachelor's Degrees Awarded by Gender and Ethnicity, From 144 Departments

	CS							CE							I							Ethnicity Totals	
	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N	Total	%
Nonresident Alien	3,278	1,177	0	28	15.4%	19.7%	0.0%	386	78	0	0	18.0%	17.9%	0.0%	273	142	0	0	8.7%	11.1%		5,362	15.6%
Amer Indian or Alaska Native	42	8	0	0	0.2%	0.1%	0.0%	1	0	0	0	0.0%	0.0%	0.0%	4	3	0	0	0.1%	0.2%		58	0.2%
Asian	5,647	2,094	4	63	26.5%	35.1%	44.4%	504	149	1	0	23.5%	34.3%	25.0%	583	355	0	1	18.6%	27.6%		9,401	27.3%
Black or African-American	649	231	0	5	3.0%	3.9%	0.0%	79	12	0	0	3.7%	2.8%	0.0%	255	117	0	0	8.1%	9.1%		1,348	3.9%
Native Hawaiian/ Pac Islander	53	0	0	1	0.2%	0.0%	0.0%	1	1	0	0	0.0%	0.2%	0.0%	3	3	0	0	0.1%	0.2%		62	0.2%
White	8,953	1,729	4	39	42.0%	29.0%	44.4%	888	148	2	0	41.3%	34.0%	50.0%	1,474	473	0	1	46.9%	36.8%		13,711	39.8%
Multiracial, not Hispanic	709	226	0	8	3.3%	3.8%	0.0%	81	9	1	0	3.8%	2.1%	25.0%	127	59	0	0	4.0%	4.6%		1,220	3.5%
Hispanic, any race	1,990	504	1	12	9.3%	8.4%	11.1%	208	38	0	0	9.7%	8.7%	0.0%	422	133	0	0	13.4%	10.4%		3,308	9.6%
Total Residency & Ethnicity Known	21,321	5,969	9	156				2,148	435	4	0				3,141	1,285	0	2				34,470	
Resident, ethnicity unknown	698	278	1	5				73	13	0	0				73	27	0	0				1,168	
Residency unknown	2,882	897	3	840				136	34	0	99				8	9	0	6				4,914	
Gender Totals	24,901	7,144	13	1,001				2,357	482	4	99				3,222	1,321	0	8				40,552	
%	77.7%	22.3%	0.0%					82.9%	17.0%	0.1%					70.9%	29.1%	0.0%						

* % of M and % of F columns are the percent of that gender who are of the specified ethnicity, of those whose ethnicity is known

Table B8. Bachelor's Enrollment by Gender and Ethnicity, From 147 Departments

	CS							CE							I							Ethnicity Totals	
	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N	Total	%
Nonresident Alien	11,270	3,613	5	485	12.4%	14.9%	10.4%	1,137	264	0	42	11.9%	13.2%	0.0%	1,043	521	0	0	7.3%	9.9%	0.0%	18,380	12.3%
Amer Indian or Alaska Native	199	42	0	0	0.2%	0.2%	0.0%	14	1	0	0	0.1%	0.0%	0.0%	21	12	0	0	0.1%	0.2%	0.0%	289	0.2%
Asian	23,453	8,366	18	355	25.9%	34.5%	37.5%	2,330	663	4	0	24.3%	33.0%	28.6%	2,414	1,354	1	2	16.9%	25.7%	12.5%	38,960	26.1%
Black or African-American	4,623	1,550	2	53	5.1%	6.4%	4.2%	533	132	1	74	5.6%	6.6%	7.1%	1,273	533	0	1	8.9%	10.1%	0.0%	8,775	5.9%
Native Hawaiian/ Pac Islander	95	27	0	0	0.1%	0.1%	0.0%	13	2	0	0	0.1%	0.1%	0.0%	21	7	0	0	0.1%	0.1%	0.0%	165	0.1%
White	36,831	7,016	17	1,732	40.7%	28.9%	35.4%	3,940	617	6	201	41.1%	30.7%	42.9%	6,990	1,976	6	362	49.0%	37.6%	75.0%	59,694	39.9%
Multiracial, not Hispanic	3,378	985	2	73	3.7%	4.1%	4.2%	382	92	2	0	4.0%	4.6%	14.3%	563	243	0	2	3.9%	4.6%	0.0%	5,722	3.8%
Hispanic, any race	10,719	2,668	4	129	11.8%	11.0%	8.3%	1,236	236	1	0	12.9%	11.8%	7.1%	1,948	614	1	0	13.6%	11.7%	12.5%	17,556	11.7%
Total Residency & Ethnicity Known	90,568	24,267	48	2,827				9,585	2,007	14	317				14,273	5,260	8	367				149,541	
Resident, ethnicity unknown	3,166	1,351	6	1,081				269	58	2	18				295	131	0	2				6,379	
Residency unknown	16,722	5,408	19	3,101				955	224	2	355				50	31	0	23				26,890	
Gender Totals	110,456	31,026	73	7,009				10,809	2,289	18	690				14,618	5,422	8	392				182,810	
%	78.0%	21.9%	0.1%					82.4%	17.5%	0.1%					72.9%	27.0%	0.0%						

* % of M and % of F columns are the percent of that gender who are of the specified ethnicity, of those whose ethnicity is known

Figure B5 shows the enrollment trend from Taulbee Survey data since this surge began. It illustrates both the relatively flat number of average new majors per department since 2018 and the fourteen consecutive years of growth in average total majors per department through academic year 2020-21. The average enrollment per U.S. CS department has increased to more than five times its level in fall 2006. For the past eight years, it has exceeded the previous peak reached during the dot-com enrollment surge. Currently, it is more than two and a half times that peak.

Another view of bachelor's enrollments can be gleaned from CS course-level data. Such data was first reported in CRA's Generation-CS report for the fall terms in 2005, 2010 and 2015. The Taulbee Survey began collecting follow-up data in the 2016 survey, and now does so annually. Analysis of this data for 2021 is deferred until the next issue of CRN. .

A somewhat larger fraction of the total CS bachelor's enrollment in 2021-22 is female as compared with 2020-21 (21.9 percent vs 20.9 percent). With respect to racial/ethnic diversity, the fraction of total enrollment aggregated across all three computing areas, among races/ethnicities other than Non-resident Alien, Asian and White, is 21.7 percent. Last year it was 22.3 percent. In CS, these other races/ethnicities comprised 20.9 percent of total enrollment, slightly lower than the 21.3 percent last year (Table B8).

In all three computing areas (CS, CE, and I), Resident Asians and Non-resident Aliens again comprise a larger fraction of female enrollment than male enrollment, while a larger fraction of male enrollment than female enrollment is White (Table B8). Table B7 indicates that the same comparisons continue to hold true for degree awardees in CS and I; again this year, Non-resident Aliens are approximately an equal fraction of male and female CE awardees.

Faculty Demographics

(Tables F1-F9; Figure F1)[4]

Table F1 shows the current (2021-22) and anticipated sizes, in FTE, for tenure-track, teaching, and research faculty, and postdocs. Teaching faculty are separately reported in subcategories called "Teaching Professors" and "Other Instructors". "Teaching

Figure B1. BS Production (CS & CE)

CRA Taulbee Survey 2021

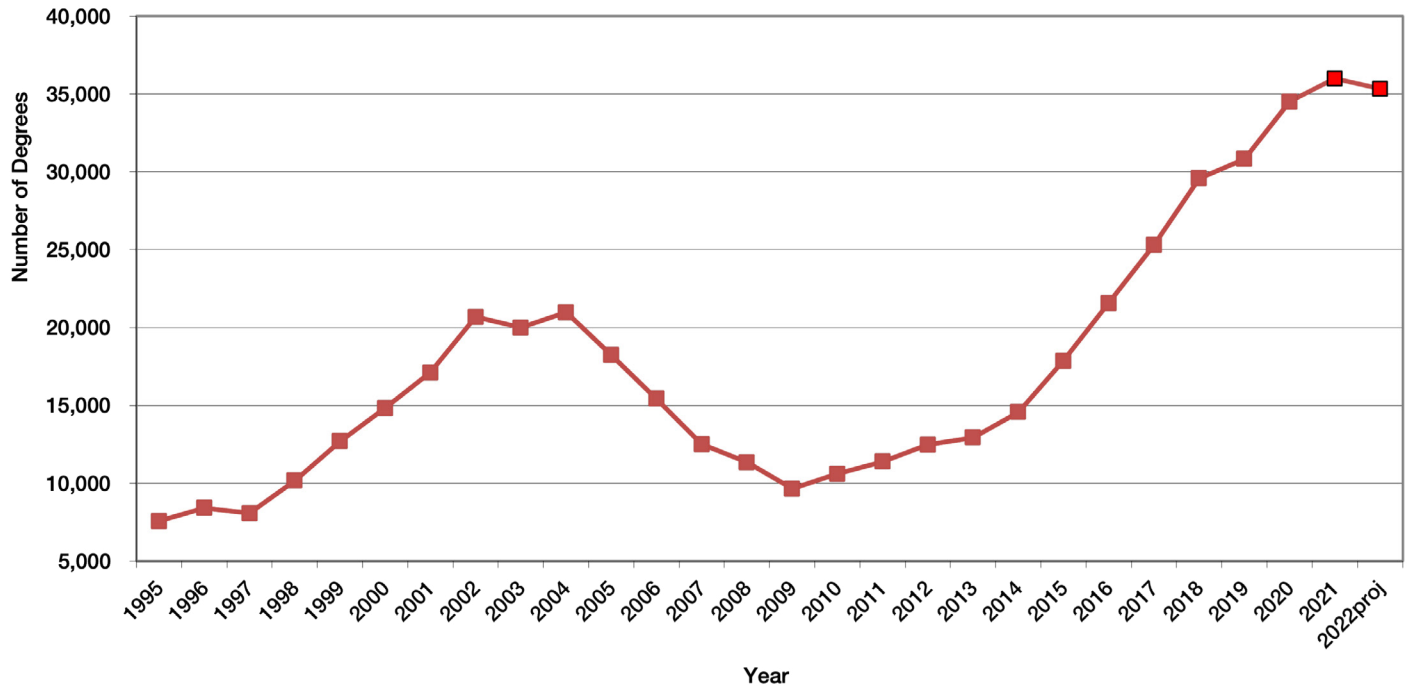


Figure B2. Newly Declared Undergraduate Majors: CS, CE, and I (beginning in 2008)

CRA Taulbee Survey 2021

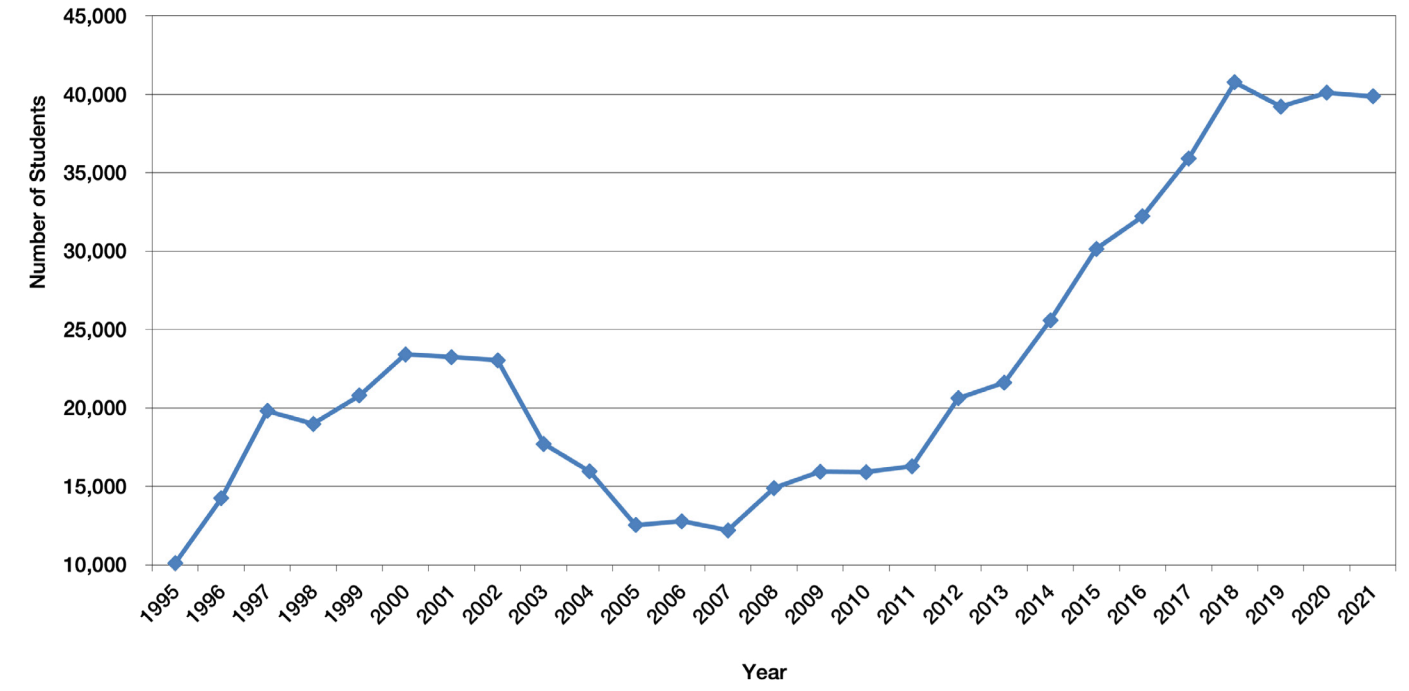


Figure B3. Bachelor's Degrees Granted by Tenure-Track Size

CRA Taulbee Survey 2021

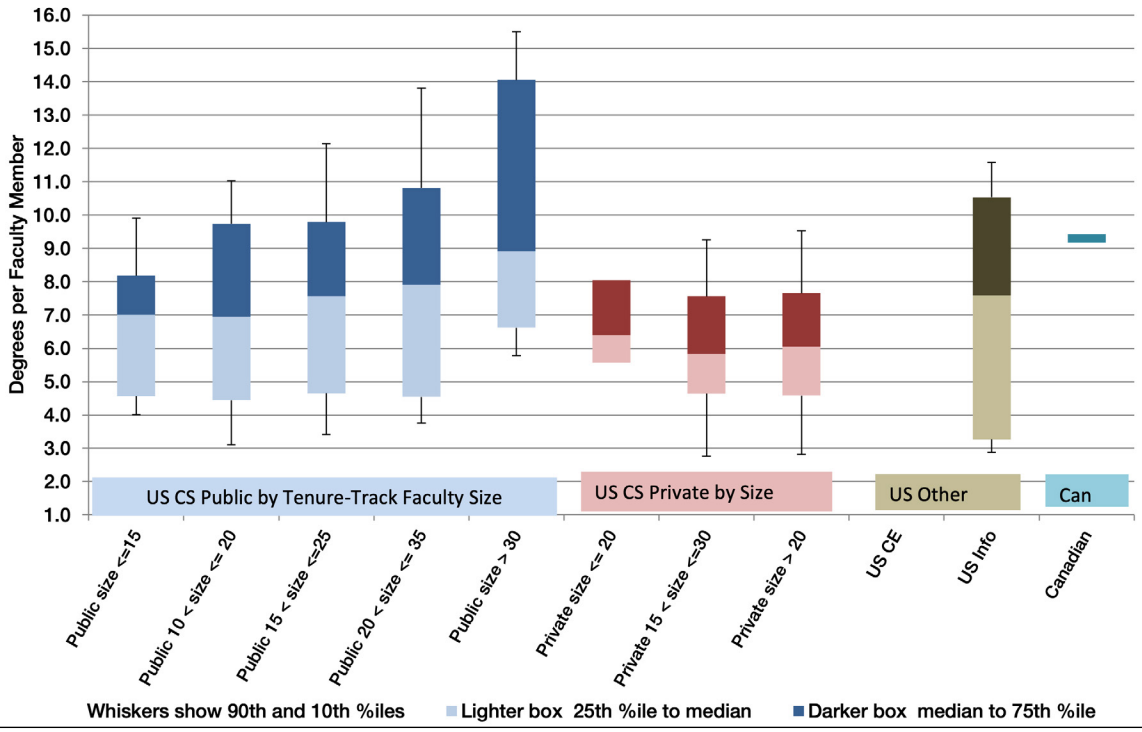


Figure B4. Bachelor's Enrollment Normalized by Tenure-Track Size

CRA Taulbee Survey 2021

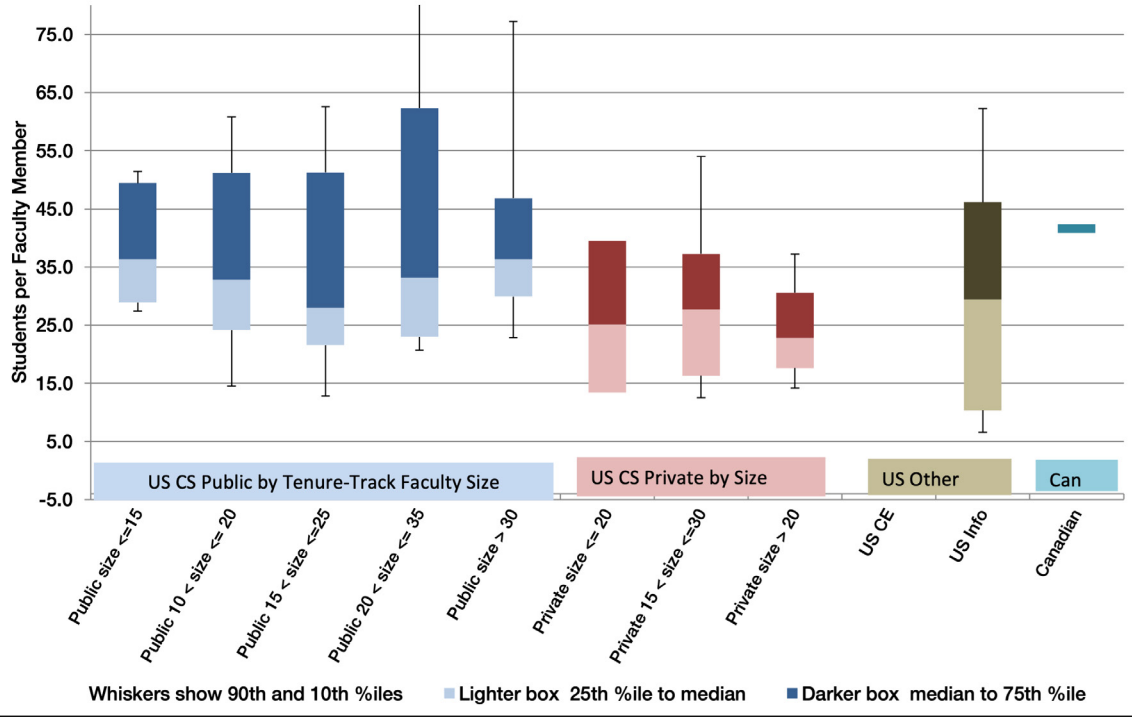
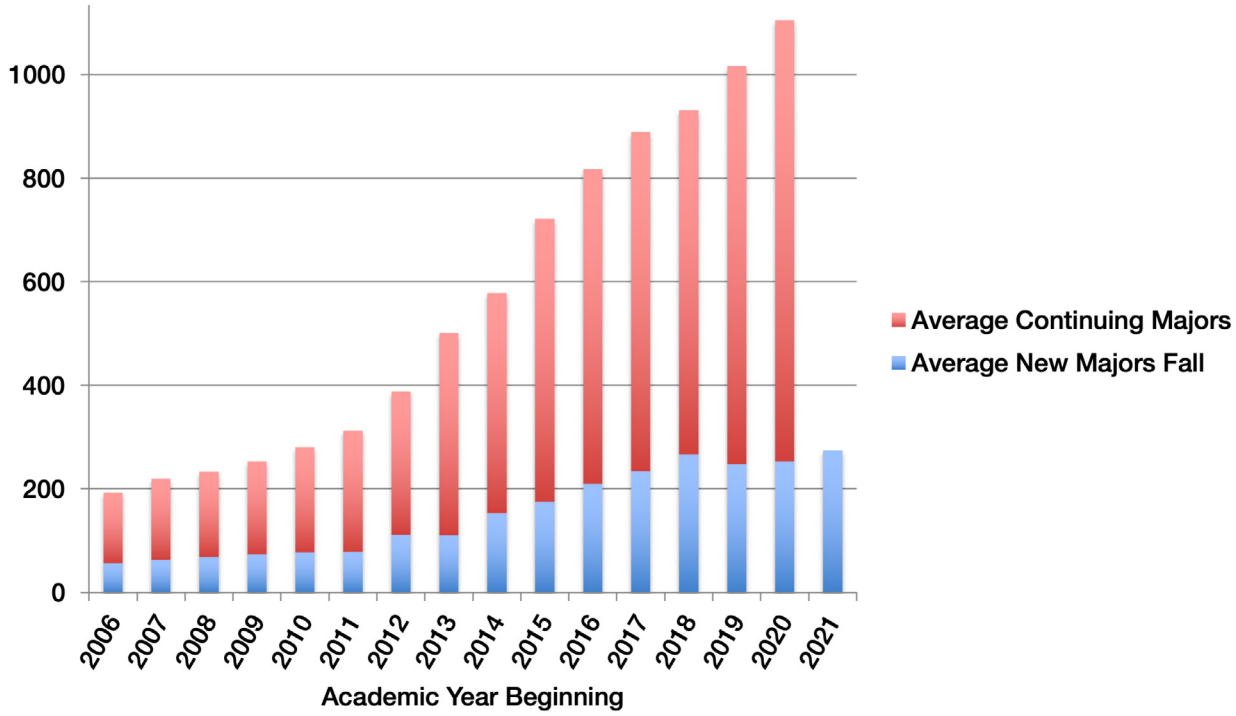


Figure B5. Average New and Continuing CS Majors per Academic Unit (U.S. CS Programs Only)

CRA Taulbee Survey 2021



Professors" on average have more varied responsibilities in teaching, scholarship, service/governance, etc., and higher expectations for visibility outside the unit or the institution. "Other Instructors" are more focused on teaching introductory or mid-level courses and tend to have shorter contract lengths, though they are still full-time faculty (the Taulbee Survey does not collect data on course-by-course adjuncts other than typical stipends per course; see the section on faculty salaries).

The average tenure-track faculty size in U.S. CS departments increased by 5.3 percent over last year. With respect to teaching faculty in U.S. CS departments, the average number of Teaching Professors per department declined by 2.9 percent, while the average number of Other Instructors increased by 17.8 percent. Last year, both categories of teaching faculty had increases, with the greater increases in the Teaching Professor category.

U.S. CS departments in both public and private institutions continue to have more Teaching Professors than Other Instructors, but the spread is greater at private institutions. U.S. CE, U.S. I, and Canadian departments also reported a preference for the Teaching Professor category of teaching faculty, and the average number of Teaching Professors increased by double-digit percentages in each of the three types of departments.

The average number of research faculty and postdocs at U.S. CS departments each increased in 2021-22, by 9.1 and 3.2 percent, respectively. Increases took place at both public and private institutions.

With the exception of Canadian institutions,, the number of tenure-track faculty per department is forecast to increase for the next two years. In general, more growth is expected for Teaching Professors than for Tenure-Track Faculty or Other Instructors, and a large increase in postdocs is also forecast at non-Canadian departments.

Figure F1 illustrates the comparative changes at U.S. CS departments in undergraduate enrollment, tenure-track faculty and teaching faculty since 2006, when the current enrollment surge began. This figure updates with recent years' data a figure from the Generation-CS report. The graph shows that teaching

Table F1. Actual and Anticipated Faculty Size by Position and Department Type

	Actual		Projected				Expected 2-Yr Growth		# Depts
	2021-22		2022-23		2023-24				
US CS Public	Total	Average	Total	Average	Total	Average	#	%	
TenureTrack	3,216	33.2	3,440	35.5	3,570	36.8	354	11.01%	97
Teaching Professors	652	8.6	738	9.7	785	10.3	133	20.40%	76
Other Instructors	529	7.5	536	7.5	552	7.8	23	4.35%	71
Research	204	6.8	213	7.1	215	7.2	11	5.39%	30
Postdoc	200	5.6	228	6.3	247	6.9	47	23.50%	36
Total	4,801	49.5	5,155	53.1	5,369	55.4	568	11.83%	97
US CS Private									
TenureTrack	1,266	37.2	1,320	38.8	1,363	40.1	97	7.66%	34
Teaching Professors	248	8.6	268	9.2	280	9.7	32	12.90%	29
Other Instructors	164	8.2	172	8.6	176	8.8	12	7.32%	20
Research	83	5.2	85	5.3	89	5.6	6	7.23%	16
Postdoc	228	13.4	247	14.5	266	15.6	38	16.67%	17
Total	1,989	58.5	2,092	61.5	2,174	63.9	185	9.30%	34
US CS Total									
TenureTrack	4,482	34	4,760	37.4	4,934	40.5	452	10.08%	131
Teaching Professors	899	6.8	1,005	8.3	1,064	9.3	165	18.35%	105
Other Instructors	693	5.3	708	5.3	728	5.6	35	5.05%	91
Research	287	2.2	298	3	304	3.3	17	5.92%	46
Postdoc	428	3.2	475	4.9	513	5.7	85	19.86%	53
Total	6,789	51.8	7,246	55.3	7,543	57.6	754	11.11%	131
US CE									
TenureTrack	116	29.0	119	29.8	121	30.3	5	4.31%	4
Teaching Professors	18	4.5	18	4.5	19	4.8	1	5.56%	4
Other Instructors	7	3.5	7	3.5	7	3.5	0	0.00%	2
Research	8	4.0	8	4.0	8	4.0	0	0.00%	2
Postdoc	19	9.5	22	11.0	27	13.5	8	42.11%	2
Total	168	42.0	174	43.5	182	45.5	14	8.33%	4
US Info									
TenureTrack	415	27.7	450	30.0	471	31.4	56	13.49%	15
Teaching Professors	177	12.6	193	13.8	206	14.7	29	16.38%	14
Other Instructors	124	12.4	131	13.1	131	13.1	7	5.65%	10
Research	7	1.8	9	2.3	12	3.0	5	71.43%	4
Postdoc	43	4.8	48	5.3	56	6.2	13	30.23%	9
Total	766	51.1	831	55.4	876	58.4	110	14.36%	15
Canadian									
TenureTrack	297	42.4	276	39.4	280	40.0	-17	-5.72%	7
Teaching Professors	56	9.3	49	8.2	49	8.2	-7	-12.50%	6
Other Instructors	37	7.4	36	7.2	36	7.2	-1	-2.70%	5
Research	4	4.0	4	4.0	4	4.0	0	0.00%	1
Postdoc	32	16.0	27	13.5	27	13.5	-5	-15.63%	2
Total	426	60.9	392	56.0	396	56.6	-30	-7.04%	7
Grand Total									
TenureTrack	5,310	33.8	5,605	35.7	5,806	37.0	496	9.34%	157
Teaching Professors	1,150	8.9	1,265	9.8	1,338	10.4	188	16.35%	129
Other Instructors	861	8.0	882	8.2	902	8.4	41	4.76%	108
Research	306	5.8	319	6.0	328	6.2	22	7.19%	53
Postdoc	522	7.9	572	8.7	623	9.4	101	19.35%	66
Total	8,149	51.9	8,643	55.1	8,997	57.3	848	10.41%	157

2021 Taulbee Survey *(continued)*

faculty increases for the past three years have kept pace with the rate of growth in the number of majors. However, since the enrollment surge began, the cumulative growth in teaching faculty is only about half that of the growth in majors. During the same period, tenure-track faculty size has increased by less than 50 percent, about 1/10 the rate of enrollment growth.

Canadian departments, on average, are larger than U.S. CS departments, in terms of both tenure-track and total faculty. Among U.S. CS departments, those at private universities are on average larger than those at public universities in both tenure-track and total faculty size. These relationships have been observed consistently for many years.

When examining the size of U.S. CE and I departments, It Is Important to note that we ask departments to report only computing-related faculty, so departments with Library Science or EE programs may report only part of their faculty.

Table F2 summarizes faculty hiring this past year. The success rate for hiring tenure-track faculty at this year's reporting U.S. CS departments was 79.8 percent, an increase from last year's reported 76.7 percent. The success rate among departments at public universities was slightly lower than that last year (76.7 percent vs 78.9 percent last year), but the success rate at private universities was much higher (87.9 percent vs 69.7 percent last year. Canadian departments once again collectively had a lower success rate than U.S. CS departments. U.S. I departments' success rate again was in between those of U.S. CS and Canadian departments. In aggregate across all types of departments, the tenure-track hiring success rate was 78.0 percent, compared to 74.1 percent in last year's report and the 70.4 percent reported two years ago.

Fewer departments provided reasons for lack of hiring success than in previous years. Two cited a lack of candidates for a specific specialty, both quantum, and several cited common problems such as a lack of sufficient candidates or strong candidates for positions, both tenure-track and teaching. A few units reported problems related to COVID (e.g. potential hire having travel problems, or virtual interviews meaning candidates couldn't make campus visits or meet

Table F2. Vacant Positions 2020-21 by Position and Department Type

	Tried to fill	Filled
US CS Public		
TenureTrack	257	197
Teaching Professors	80	69
Other Instructors	44	46
Research	27	26
Postdoc	82	93
Total	490	431
US CS Private		
TenureTrack	99	87
Teaching Professors	30	21
Other Instructors	19	16
Research	11	14
Postdoc	50	49
Total	209	187
US CS Total		
TenureTrack	356	284
Teaching Professors	110	90
Other Instructors	63	62
Research	38	40
Postdoc	132	142
Total	699	618
US CE		
TenureTrack	5	5
Teaching Professors	3	3
Other Instructors	0	0
Research	1	1
Postdoc	3	5
Total	12	14
US Info		
TenureTrack	49	36
Teaching Professors	20	15
Other Instructors	12	8
Research	4	1
Postdoc	27	23
Total	112	83
Canadian		
TenureTrack	27	16
Teaching Professors	3	3
Other Instructors	2	2
Research	0	1
Postdoc	3	29
Total	35	51
Grand Total		
TenureTrack	437	341
Teaching Professors	136	111
Other Instructors	77	72
Research	43	43
Postdoc	165	199
Total	858	766

faculty, or budget constraints), but fewer reported COVID hiring problems than last year.

Although the success rate for hiring tenure-track faculty improved from last year, the total number of new tenure-track hires in all reporting departments, which had been steadily increasing since at least 2016, decreased for the second year in a row, from 422 in 2019 to 374 in 2020 to 341 In 2021. At least part of the decline observed this year Is due to the decreased number of respondents.

Gender diversity continued to improve in 2021-22 when all categories of academic positions (tenure-track, teaching faculty, research faculty, and postdoc) are considered

Table F2a. Reasons Positions Left Unfilled

Reason	# Reported	% of Reasons
Didn't find a person who met our hiring goals	14	14%
Offers turned down	54	53%
Technically vacant, not filled for admin reasons	6	6%
Hiring in progress	22	22%
Other	5	5%
Total Reasons Provided	101	
Problems with persons not meeting hiring goals		**# Given**
Specialty Area (quantum)		2
Too few candidates, candidates unprepared, salary mismatch		4

Table F3. Gender of Newly Hired Faculty

	Tenure-Track		Teaching Professors		Other Instructors		Research		Postdoc		Total	
Male	219	67.6%	75	66.4%	36	70.6%	24	68.6%	135	73.8%	489	69.3%
Female	102	31.5%	37	32.7%	15	29.4%	11	31.4%	48	26.2%	213	30.2%
Nonbinary/Other	3	0.9%	1	0.9%	0	0.0%	0	0.0%	0	0.0%	4	0.6%
Unknown	0		0		1		0		3		4	
Total	324		113		52		35		186		710	

Table F4. Ethnicity of Newly Hired Faculty

	Tenure-Track		Teaching Professors		Other Instructors		Research		Postdoc		Total	
Nonresident Alien	38	13.2%	7	6.7%	6	13.3%	6	17.6%	27	18.4%	84	13.6%
American Indian / Alaska Native	0	0.0%	1	1.0%	0	0.0%	0	0.0%	0	0.0%	1	0.2%
Asian	123	42.9%	30	28.8%	7	15.6%	6	17.6%	39	26.5%	205	33.2%
Black or African-American	16	5.6%	3	2.9%	4	8.9%	0	0.0%	4	2.7%	27	4.4%
Native Hawaiian/ Pacific Islander	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
White	86	30.0%	49	47.1%	24	53.3%	15	44.1%	44	29.9%	218	35.3%
Multiracial, not Hispanic	3	1.0%	2	1.9%	0	0.0%	0	0.0%	5	3.4%	10	1.6%
Hispanic, any race	9	3.1%	4	3.8%	1	2.2%	1	2.9%	5	3.4%	20	3.2%
Resident, race/ethnic unknown	12	4.2%	8	7.7%	3	6.7%	6	17.6%	23	15.6%	52	8.4%
Total known residency	287		104		45		34		147		617	
Residency Unknown	31		9		4		1		37		82	
Total	318		113		49		35		184		699	

Table F5. Faculty Losses

Died	12
Retired	100
Took Academic Position Elsewhere	110
Took Nonacademic Position	46
Remained, but Changed to Part Time	17
Other	13
Unknown	5
Total	303

collectively. This year the fraction of females among newly hired faculty is 30.2 percent vs 28.5 percent last year (Table F3). Among those newly hired into tenure-track positions, the proportion who are female improved to 31.5 percent from 26.4 percent reported last year. As has been the case for the past several years, the percentage of females among new tenure-track faculty hires and the corresponding percentage among newly hired faculty overall both are higher than the percentage of females among new Ph.D.s produced during the past year (24.7 percent).

Table F6. Gender of Current Faculty

	Full		Associate		Assistant		Teaching Professors		Other Instructors		Research		Postdoc		Total	
Male	1,862	83.1%	935	75.4%	1,091	73.4%	719	69.1%	533	71.8%	231	74.0%	431	74.4%	5,802	75.9%
Female	378	16.9%	304	24.5%	394	26.5%	316	30.4%	208	28.0%	81	26.0%	148	25.6%	1,829	23.9%
Nonbinary/Other	0	0.0%	1	0.1%	2	0.1%	5	0.5%	1	0.1%	0	0.0%	0	0.0%	9	0.1%
Unknown	88		19		55		31		11		6		48		258	
Total	2,328		1,259		1,542		1,071		753		318		627		7,898	

Table F7. Ethnicity of Current Faculty

	Full		Associate		Assistant		Teaching Professors		Other Instructors		Research		Postdoc		Total	
Nonresident Alien	15	0.70%	26	2.20%	228	16.30%	69	7.10%	23	3.30%	13	4.40%	111	20.70%	485	6.70%
American Indian / Alaska Native	1	0.00%	2	0.20%	2	0.10%	9	0.90%	3	0.40%	0	0.00%	0	0.00%	17	0.20%
Asian	682	31.80%	381	32.50%	499	35.80%	145	14.90%	72	10.50%	60	20.50%	158	29.40%	1,997	27.70%
Black or African-American	24	1.10%	26	2.20%	45	3.20%	27	2.80%	35	5.10%	6	2.00%	8	1.50%	171	2.40%
Native Hawaiian/ Pacific Islander	0	0.00%	2	0.20%	3	0.20%	1	0.10%	3	0.40%	0	0.00%	0	0.00%	9	0.10%
White	1,271	59.20%	612	52.30%	536	38.40%	639	65.50%	454	66.00%	197	67.20%	196	36.50%	3,905	54.20%
Multiracial, not Hispanic	11	0.50%	7	0.60%	6	0.40%	5	0.50%	5	0.70%	2	0.70%	9	1.70%	45	0.60%
Hispanic, any race	40	1.90%	38	3.20%	29	2.10%	42	4.30%	20	2.90%	6	2.00%	13	2.40%	188	2.60%
Resident, race/ ethnic unknown	104	4.80%	77	6.60%	47	3.40%	39	4.00%	73	10.60%	9	3.10%	42	7.80%	391	5.40%
Total known residency	2,148		1,171		1,395		976		688		293		537		7,208	
Residency Unknown	180		87		145		90		64		25		90		681	
Total	2,328		1,258		1,540		1,066		752		318		627		7,889	

Table F8. Current Tenured and Tenure-Track Faculty by Gender and Ethnicity, From 145 Departments

	CS							CE							I							Ethnicity Totals	
	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N	Total	%
Nonresident Alien	11	4	0	0	0.6%	1.2%		18	7	0	1	2.2%	2.7%		177	50	0	1	17.9%	13.9%	0.0%	269	6.0%
Amer Indian or Alaska Native	0	1	0	0	0.0%	0.3%		1	1	0	0	0.1%	0.4%		0	2	0	0	0.0%	0.6%	0.0%	5	0.1%
Asian	575	107	0	0	33.8%	31.4%		283	98	0	0	34.1%	37.1%		377	122	0	0	38.2%	34.0%	0.0%	1,562	34.8%
Black or African-American	20	4	0	0	1.2%	1.2%		15	11	0	0	1.8%	4.2%		25	20	0	0	2.5%	5.6%	0.0%	95	2.1%
Native Hawaiian/ Pac Islander	0	0	0	0	0.0%	0.0%		2	0	0	0	0.2%	0.0%		2	1	0	0	0.2%	0.3%	0.0%	5	0.1%
White	1,052	215	0	4	61.9%	63.0%		477	135	0	0	57.5%	51.1%		378	158	1	0	38.3%	44.0%	100.0%	2,419	53.9%
Multiracial, not Hispanic	9	2	0	0	0.5%	0.6%		5	2	0	0	0.6%	0.8%		5	1	0	0	0.5%	0.3%	0.0%	24	0.5%
Hispanic, any race	32	8	0	0	1.9%	2.3%		28	10	0	0	3.4%	3.8%		24	5	0	0	2.4%	1.4%	0.0%	107	2.4%
Total Residency & Ethnicity Known	1,699	341	0	4				829	264	0	1				988	359	1	1				4,486	
Resident, ethnicity unknown	80	15	0	9				51	22	0	4				31	12	0	4				228	
Residency unknown	83	22	0	75				55	18	1	14				72	23	1	50				412	
Gender Totals	1,862	378	0	88				935	304	1	19				1,091	394	2	55				5,126	
%	83.1%	16.9%	0.0%					75.4%	24.5%	0.1%					73.4%	26.5%	0.1%						

* % of M and % of F columns are the percent of that gender who are of the specified ethnicity, of those whose ethnicity is known

Table F9a. Current Non-Tenure-Track Faculty by Gender and Ethnicity, From 142 Departments

	Teaching Professors							Other Instructors							Ethnicity Totals	
	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Total	%
Nonresident Alien	54	14	1	1	8.3%	4.9%	25.0%	15	8	0	0	3.4%	4.7%	0.0%	92	5.9%
Amer Indian or Alaska Native	6	3	0	0	0.9%	1.1%	0.0%	3	0	0	0	0.7%	0.0%	0.0%	12	0.8%
Asian	86	59	0	0	13.2%	20.8%	0.0%	50	22	0	0	11.2%	13.0%	0.0%	217	14.0%
Black or African-American	18	9	0	0	2.8%	3.2%	0.0%	26	9	0	0	5.8%	5.3%	0.0%	62	4.0%
Native Hawaiian/ Pac Islander	1	0	0	0	0.2%	0.0%	0.0%	3	0	0	0	0.7%	0.0%	0.0%	4	0.3%
White	454	185	3	0	69.6%	65.1%	75.0%	327	126	1	1	73.5%	74.6%	100.0%	1,093	70.4%
Multiracial, not Hispanic	3	2	0	0	0.5%	0.7%	0.0%	4	1	0	0	0.9%	0.6%	0.0%	10	0.6%
Hispanic, any race	30	12	0	0	4.6%	4.2%	0.0%	17	3	0	0	3.8%	1.8%	0.0%	62	4.0%
Total Residency & Ethnicity Known	652	284	4	1				445	169	1	1				1,552	
Resident, ethnicity unknown	25	13	0	1				46	27	0	0				112	
Residency unknown	42	19	1	29				42	12	0	10				154	
Gender Totals	719	316	5	31				533	208	1	11				1,818	
%	69.1%	30.4%	0.5%					71.8%	28.0%	0.1%						

Table F9b. Current Non-Tenure-Track Research Faculty and Postdoctorates by Gender and Ethnicity, From 109 Departments

	Non-Tenure-Track Research							Postdoctorates							Ethnicity Totals	
	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Total	%
Nonresident Alien	9	4	0	0	4.3%	5.5%		82	28	0	1	22.8%	21.1%		124	15.9%
Amer Indian or Alaska Native	0	0	0	0	0.0%	0.0%		0	0	0	0	0.0%	0.0%		0	0.0%
Asian	41	19	0	0	19.4%	26.0%		117	40	0	1	32.5%	30.1%		218	28.0%
Black or African-American	5	1	0	0	2.4%	1.4%		4	4	0	0	1.1%	3.0%		14	1.8%
Native Hawaiian/Pac Islander	0	0	0	0	0.0%	0.0%		0	0	0	0	0.0%	0.0%		0	0.0%
White	150	47	0	0	71.1%	64.4%		142	54	0	0	39.4%	40.6%		393	50.4%
Multiracial, not Hispanic	2	0	0	0	0.9%	0.0%		4	5	0	0	1.1%	3.8%		11	1.4%
Hispanic, any race	4	2	0	0	1.9%	2.7%		11	2	0	0	3.1%	1.5%		19	2.4%
Total Residency & Ethnicity Known	211	73	0	0				360	133	0	2				779	
Resident, ethnicity unknown	7	2	0	0				33	5	0	4				51	
Residency unknown	13	6	0	6				38	10	0	42				115	
Gender Totals	231	81	0	6				431	148	0	48				945	
%	74.0%	26.0%	0.0%					74.4%	25.6%	0.0%						

* % of M and % of F columns are the percent of that gender who are of the specified ethnicity, of those whose ethnicity is known

Among new tenure-track faculty whose residency is known, White, Non-resident Alien or Asian hires collectively comprise 86.1 percent. Among newly hired teaching faculty, these three categories comprise 82-83 percent of the new hires, while among research faculty it is about 79 percent and among postdocs it is about 75 percent (Table F4). The teaching faculty percentages are higher than those reported last year, while the values for the other categories of faculty are lower; lower values indicate improved overall diversity.

Table F10 shows the sources of new faculty of each type. For newly hired assistant professors, the fraction who had been postdocs in the previous year was about 30 percent compared to 28 percent last year and the year before. Since we began collecting such information in 2015, this percentage has ranged from 21 to 31 percent. About 33 percent of new assistant professors were new Ph.Ds, while about 27 percent of new assistant professors were in other academic positions the previous year. We don't know the previous academic rank of the new assistant professors who came from other academic positions; they might have been teaching faculty or research faculty as a transitional position, or they might have come from other tenure-track positions.

Among senior faculty hires, 68 had information about their previous position reported this year compared to 53 last year and 90 the year before, Of this year's new senior hires, 82 percent came from other academic institutions and only seven percent from industry. Last year's data favored other academic institutions by a smaller margin. Among Teaching Professors, only 18 percent were hired without a Ph.D, while this fraction was 88 percent for Other Instructors. Last year's respective percentages were 17 and 52 percent. This year, 29 percent of new research faculty did not have a Ph.D., compared with 33 percent reported last year and 55 percent reported two years ago.

The number of faculty losses reported this year is similar to that reported last year, considering there are fewer departments reporting (Table F5). Retirements and departures for other academic positions again comprise the majority of all departures. This year there are not nearly as many losses reported in the "other" and "unknown" categories as there were last year.

The proportion of faculty who are female is slightly higher this year than last year, for all faculty types including all tenure-track ranks (Table F6). Table F7 shows the breakdown of race/ethnicity among current faculty in each category. The proportion of current faculty who are American Indian, Black, Native Hawaiian, Multiracial or Hispanic collectively totals between 3.5 and 6.4 percent except for the two categories of teaching faculty, where these ethnicities total 8.6 for Teaching Professors and 9.5 percent for Other Instructors. Aggregated across all categories of faculty, the proportion Is 5.9 percent.

The vast majority of departments reported gender by race/ethnicity breakdowns of their faculty, Table F8 shows, for each race/ethnicity category at each tenure-track faculty rank, the percentage of total male faculty at that rank represented by that race/ethnicity category, and the percentage of total female faculty at that rank represented by that category. Tables F9a and F9b do likewise, respectively, for teaching faculty and for research faculty and postdocs. The patterns among the tenure-

Table F10. Source of New Faculty

Source	Full	Associate	Assistant	Teaching Prof	Other Instruc	Research	Postdoc	Total	% Total from Source	% Assistant from Source
New PhD	3	4	82	19	4	5	110	227	40%	33%
From Postdoc	0	0	75	9	1	9	14	85	15%	30%
From Other Academic	22	34	68	30	8	4	23	189	34%	27%
From Industry	3	2	26	18	3	6	4	62	11%	10%
Total With Hire Source	28	40	251	76	16	24	151	563		
Hired Without PhD	0	0	10	14	14	7	8	53		
% Hired Without PhD			4%	18%	88%	29%				

track faculty are very much the same as they were last year. Among teaching faculty, a greater proportion of both male and female Teaching Professors are Asian, and a smaller proportion of both genders are White compared with last year. A greater proportion of male Other Instructors are Asian and a smaller proportion are White, but for female Other Instructors the change is in the opposite direction and is of lesser magnitude. A greater percentage of male research faculty are White and a smaller percentage are Asian compared with last year, while a greater percentage of female research faculty are Asian and a smaller percentage are White. Finally, a greater percentage of male postdocs are White and a smaller percentage are Non-resident Aliens compared with last year, while a greater percentage of female postdocs are Asian and a smaller percentage are White.

Research Expenditures

(Table R1; Figures R1-R2)

Table R1 shows the distribution of departments' total research expenditure (including indirect costs or "overhead" as stated on project budgets) from external sources of support. Figures R1 and R2 show the per capita expenditure, where capitation is computed two ways. The first (Figure R1) is relative only to the number of tenure-track faculty members. The second (Figure R2) is relative to research faculty and postdocs as well as tenure-track faculty. Canadian levels are shown in Canadian dollars.

Median research expenditures for 2020-21 increased considerably over reported 2019-20 values at U.S. CS and U.S. I departments. U.S. CS departments at public Institutions saw an increase of nearly 23 percent in the median, while at private institutions, the median increased by 41 percent. U.S. I departments reported an increase of 82 percent. Note that each department type had fewer respondents this year, and because there Is a considerable range in the reported expenditure values across Institutions within each department type, the specific Institutions reporting may well influence the magnitude of change. An insufficient number of Canadian and CE departments reported expenditure information.

Figure FI. Comparative Change in Majors and instructional Resources per U.S. CS Unit

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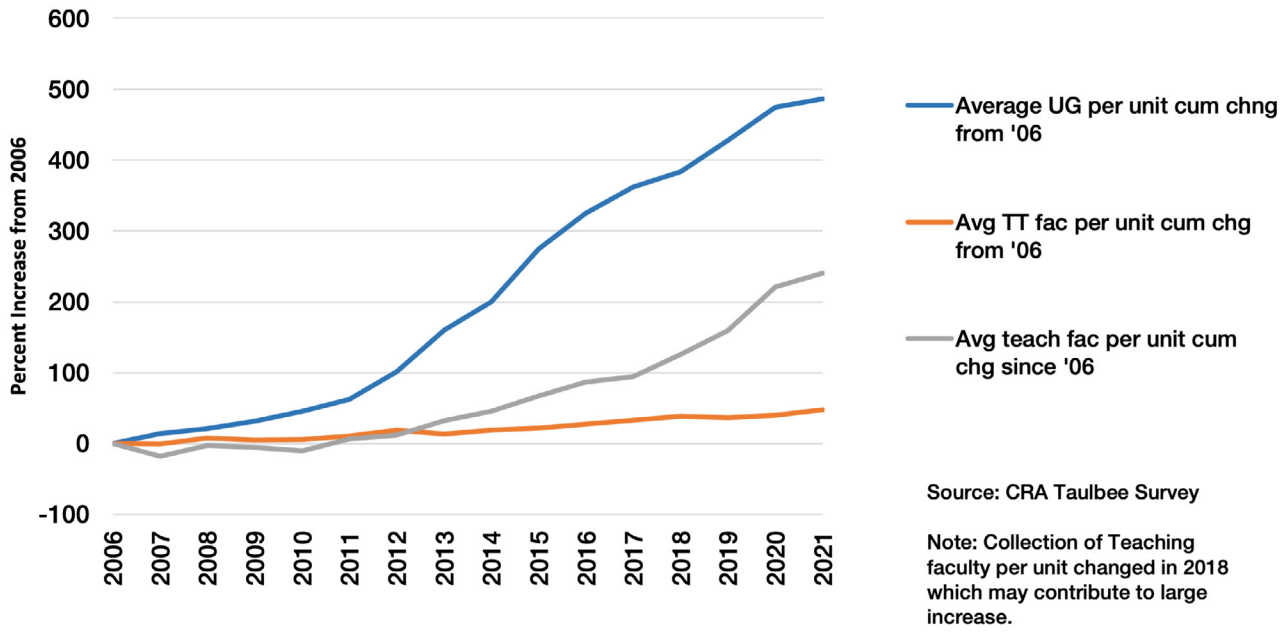

Table R1. Total Expenditure from External Sources for Computing Research

Department Type	# Depts	Percentile of Department Averages				
		10th	25th	50th	75th	90th
US CS Public	61	1,671,006.5	3,262,659.5	5,685,641	13,618,659.25	20,976,793.3
US CS Private	20	3,306,599.5	5,012,275	9,706,177.5	17,480,420	32,692,749
US CE	1					
US Info	11	2,757,432	3,895,711	5,842,552	6,885,236.5	7,662,164
Canadian	2					

The U.S. CS data show a tendency for larger departments to have more external funding per capita than smaller departments among the private institutions; for public institutions, the largest departments have more per capita funding but there's little size-based difference otherwise. These statements hold for each capitation method. There has been a trend consistently at public institutions for the larger departments to have more external funding per capita, but the pattern at private institutions is more recent.

Graduate Student Support

(Tables G1-G2; Figures G1-G3)

Table G1 shows the number of doctoral students supported as full-time students as of fall 2021, further categorized as teaching assistants (TAs), research assistants (RAs), and full-support fellows. The table also shows the split between those on institutional vs. external funds. Table G1a shows similar data for supported master's students.

The average number of TAs on institutional funds among doctoral students in U.S. CS departments increased this year, from 33.5 to 37.7. Both public and private universities reported an increase. U.S. I departments showed little change from last year. The small number of CE and Canadian departments make their comparative averages subject to considerable volatility.

Among research associates, the average number of doctoral students per U.S. CS and U.S. I department who were supported on both institutional and external funding increased compared to

Figure R1. Research Expenditures Normalized by Tenure-Track Size

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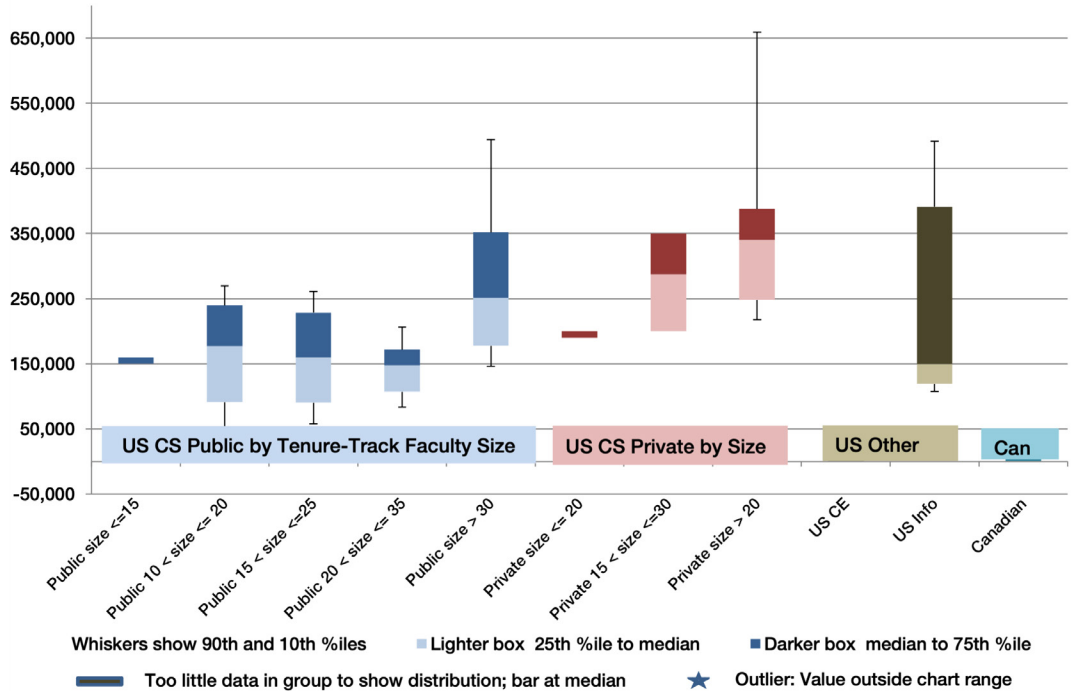

Figure R2. Research Expenditures Normalized by Tenure-Track + Research Faculty + Postdoctorates

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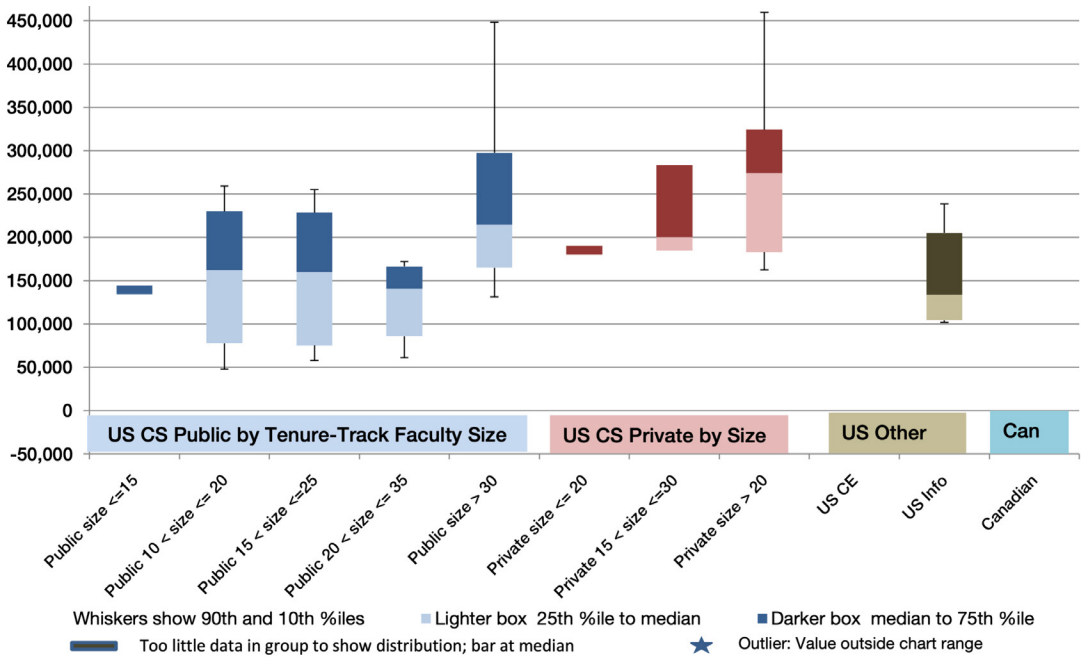

last year. The average declined slightly in U.S. CS departments at public universities for support on both Institutional and external funds; at private universities the average on external funds held steady and the average In Institutional funds increased. At U.S. I departments, the average number of full-support fellows on both institutional and external funds increased somewhat compared with last year.

Among U.S. CS doctoral students at public institutions, about 57 percent of supported students are RAs, 39 percent are TAs, and 4 percent are full-support fellows. About 54 percent of all the aggregate support comes from institutional sources. At private institutions, 68 percent are RAs, 19 percent are TAs, and 13 percent are full-support fellows. About 52 percent of the aggregate support comes from institutional funds at U.S. CS departments. Across all department types, 33 percent of support is for TAs, 59 percent for RAs, and 8 percent for full-support fellows; institutional funds comprise about 53 percent of all doctoral support.

Among master's students across all department types, 71 percent of support is for TAs, compared with 66 reported last year. Conversely, 25 percent of support is for RAs, compared with last year's 31 percent. The remainder were full-support fellows. At U.S. CS departments, TA support comprises 75 percent, RA support is 22 percent and full-support fellows is 3 percent. U.S. CS departments at private institutions provide 86 percent of their master's support for TAs and only 12 percent for RAs and 2 percent for full-support fellows, while at U.S. CS public institutions, the distribution is about the same as for all department types combined.

Table G1. Doctoral Students Supported as Full-Time Students by Department Type

		On Institutional Funds						On External Funds						Total
Department Type	# Dept	Teaching Assistants		Research Assistants		Full-Support Fellows		Teaching Assistants		Research Assistants		Full-Support Fellows		
US CS Public	88	3,748.8	0.4	1,366.1	0.1	228.0	0.0	34.5	0.0	4,252.9	0.4	184.5	0.0	9,814.7
US CS Private	29	661.9	0.2	910.3	0.2	319.0	0.1	18.0	0.0	1,597.3	0.4	155.4	0.0	3,661.7
US CS Total	117	4,410.6	0.3	2,276.3	0.2	547.0	0.0	52.5	0.0	5,850.2	0.4	339.9	0.0	13,476.5
US CE	2	8.5	0.0		0.0	37.0	0.2		0.0	16.0	0.1	177.0	0.7	238.5
US Info	15	293.0	0.3	145.8	0.2	56.0	0.1	1.0	0.0	347.9	0.4	31.0	0.0	874.6
Canadian	4	145.0	0.4	49.0	0.1	5.0	0.0	5.0	0.0	133.0	0.4	1.0	0.0	338.0
Grand Total	138	4,857.1	0.3	2,471.1	0.2	645.0	0.0	58.5	0.0	6,347.1	0.4	548.9	0.0	14,927.6

Table G1a. Master's Students Supported as Full-Time Students by Department Type

		On Institutional Funds						On External Funds						Total
Department Type	# Dept	Teaching Assistants		Research Assistants		Full-Support Fellows		Teaching Assistants		Research Assistants		Full-Support Fellows		
US CS Public	77	1,666.5	0.7	136.3	0.1	59.0	0.0	12.5	0.0	467.0	0.2	9.0	0.0	2,350.3
US CS Private	15	651.0	0.9	30.4	0.0	4.0	0.0	1.0	0.0	58.0	0.1	14.0	0.0	758.4
US CS Total	92	2,317.5	0.7	166.7	0.1	63.0	0.0	13.5	0.0	525.0	0.2	23.0	0.0	3,108.7
US CE	1	85.0	0.8		0.0		0.0		0.0	23.0	0.2		0.0	108.0
US Info	15	165.6	0.7	17.3	0.1	27.0	0.1	0.0	0.0	29.3	0.1	0.0	0.0	239.1
Canadian	4	199.0	0.4	76.0	0.2	14.0	0.0	12.0	0.0	160.0	0.3	0.0	0.0	461.0
Grand Total	112	2,767.1	0.7	259.9	0.1	104.0	0.0	25.5	0.0	737.3	0.2	23.0	0.0	3,916.8

Table G2 shows the distribution of stipends for TAs, RAs, and full-support fellows. U.S. CS data are further broken down in this table by public and private institution. Figures G1-G3 further break down the U.S. CS data by size of department and by geographic location of the university.

Compared with last year's report, the median TA salaries at U.S. CS departments were flat at public institutions while increasing 4.3 percent at private institutions. Median TA salaries at private institutions are over one-third higher than at public institutions. Median salaries of RAs rose 2.4 percent at public institutions but rose 8.7 percent at private institutions. Median RA salaries at private institutions are about 47 percent higher than at public institutions. For full-support fellows, median salaries rose 3.8 percent at U.S. public institutions and rose 4.3 percent at U.S. private institutions. Median full-support fellow salaries are 21 percent higher at private institutions.

Median stipends at U.S. I schools fall in between those at public and private U.S. CS departments for all three types of support. This Is the same result as was found last year.

At U.S. CS departments, larger departments tend to have higher salaries than do smaller departments for TAs, RAs, and full-support fellows. The one exception is that smaller public departments (those of size 10 to 20) have higher full-support fellow) stipends than other public departments, but because the number of responding departments in this category is small, the results are more easily skewed.

Faculty Salaries

(Tables S1-S22; Figures S1-S9)

Each department was asked to report individual (but anonymous) faculty salaries if possible; otherwise, the department was requested to provide the mean salary for each rank (full, associate, and assistant professors and non-tenure-track teaching faculty, research faculty, and post-doctorates) and the number of persons at each rank. The salaries are those in effect on January 1, 2022 for U.S. departments; nine-month salaries are reported in U.S. dollars. For Canadian departments, twelve-month salaries are reported in Canadian dollars. Respondents were asked to include salary supplements such as salary monies from

Table G2. Fall 2021 Academic-Year Graduate Stipends by Department Type and Support Type

Teaching Assistantships						
		Percentiles of Department Averages				
Department Type	**# Depts**	**10th**	**25th**	**50th**	**75th**	**90th**
US CS Public	94	15,090	17,495	20,000	23,000	25,614
US CS Private	28	17,672	23,967	27,770	34,153	35,309
US CE	2					
US Info	13	17,600	20,700	23,666	26,176	29,167
Canadian	5			9,000		
Research Assistantships						
		Percentiles of Department Averages				
Department Type	**# Depts**	**10th**	**25th**	**50th**	**75th**	**90th**
US CS Public	96	16,133	18,433	20,764	241,64	27,087
US CS Private	32	23,847	26,138	30,471	35,226	36,777
US CE	2					
US Info	14	18,348	21,116	23,949	26,132	26,819
Canadian	4			15,919		
Full-Support Fellows						
		Percentiles of Department Averages				
Department Type	**# Depts**	**10th**	**25th**	**50th**	**75th**	**90th**
US CS Public	54	16,764.8	22,500	25,440	30,000	34,000
US CS Private	29	24,658	27,125	30,838.5	35,882.75	36,902
US CE	2					
US Info	10	20,700	22,733	26,395	30,250	33,032
Canadian	2					

Figure G1. Teaching Assistantship Stipends

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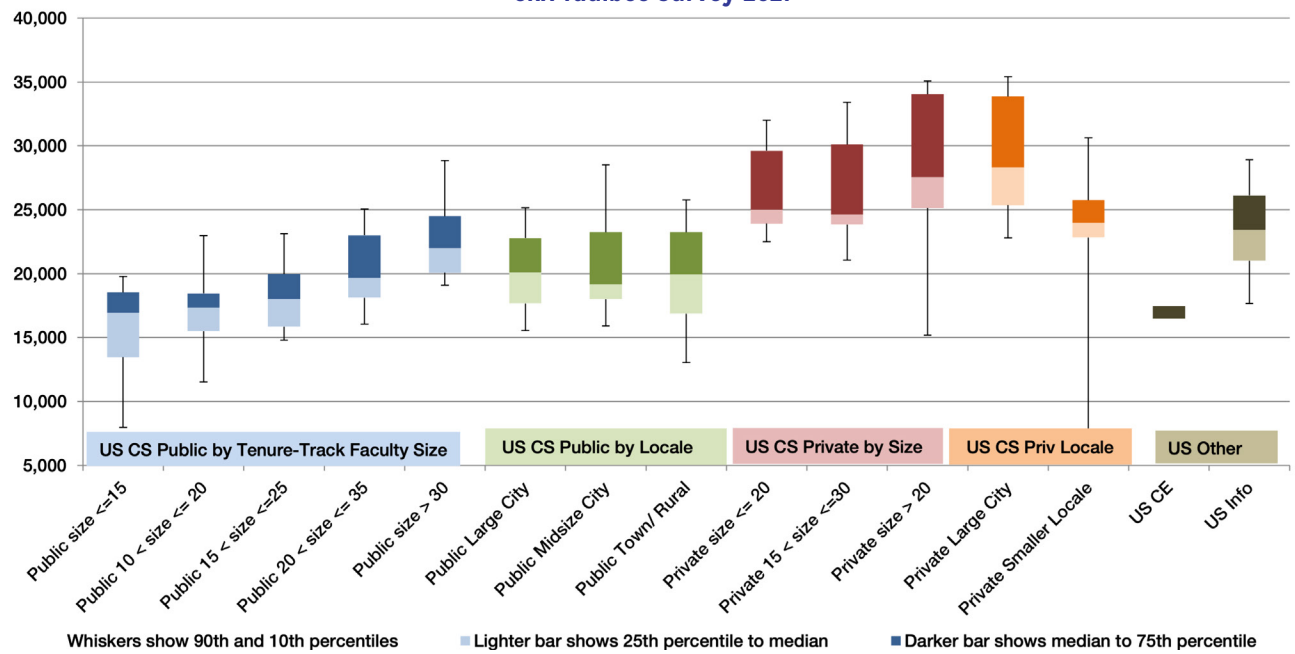

Figure G2. Research Assistantship Stipends

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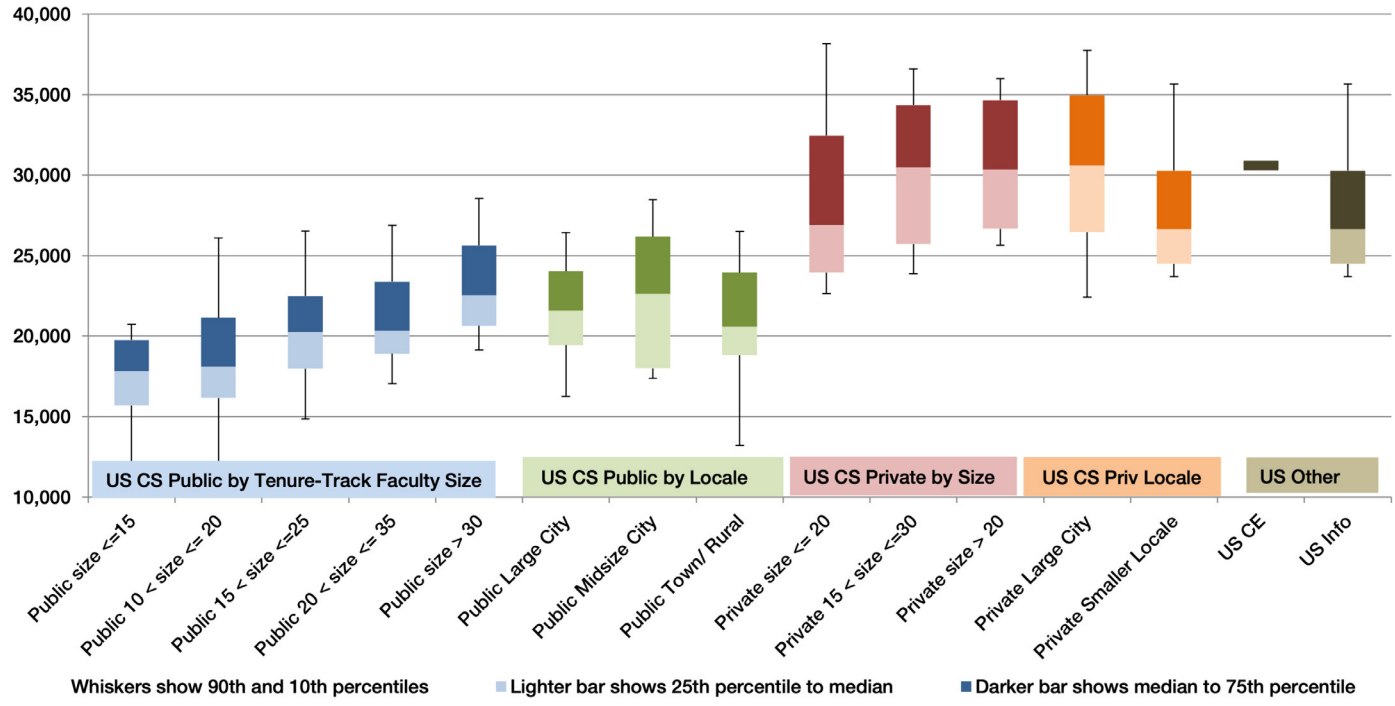

Figure G3. Full Support Fellows Stipends

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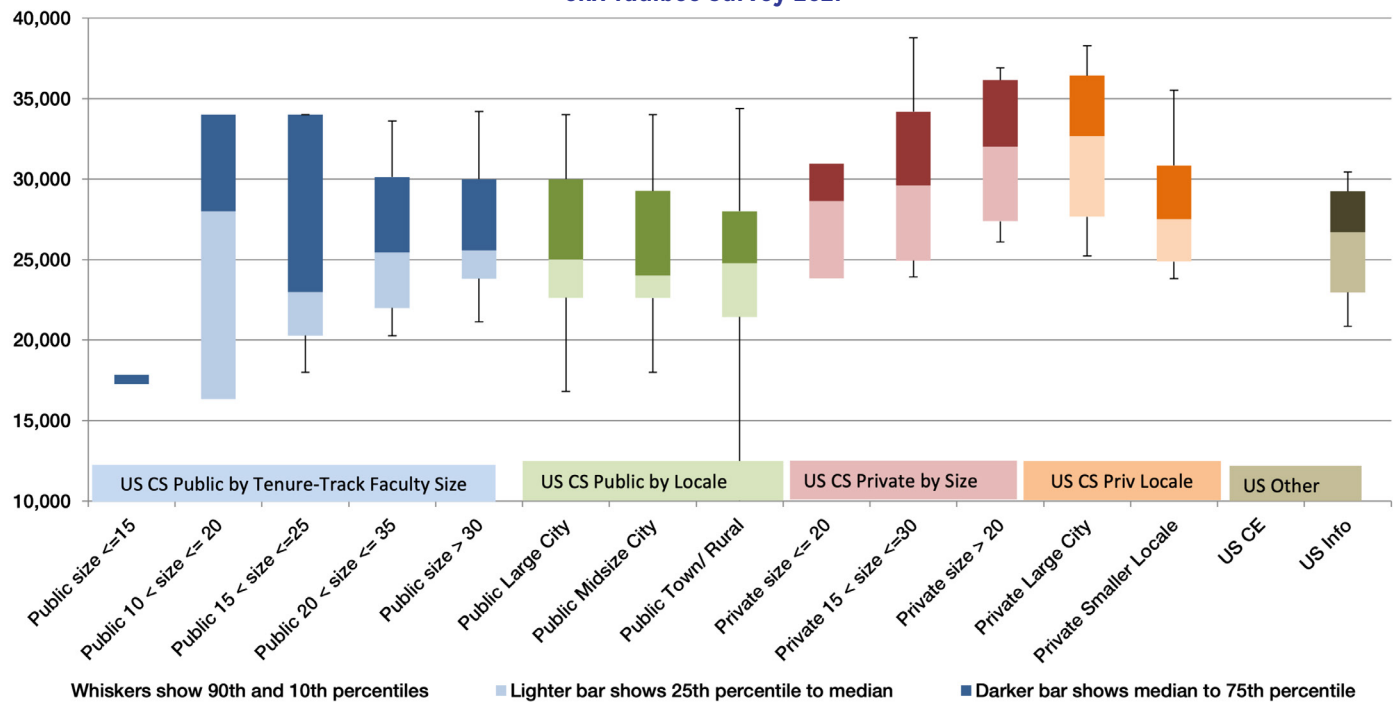


endowed positions.

U.S. CS data is reported in Tables S1-S16 and in the box and whiskers diagrams comprising Figures S1-S9. Data for CE, I, Canadian, and new Ph.D.s are reported in Tables S17-S20. The tables and diagrams contain distributional data (first decile, quartiles, and ninth decile) computed from the department averages only. Thus, for example, a table row labeled "50" or the median line in a diagram is the median of the averages for the departments that reported within the stratum (the number of such departments reporting is shown in the "depts" row). Therefore, it is not a true median of all of the salaries.

In these tables, we report salary data for senior faculty based on time in rank, for more meaningful comparison of individual or departmental faculty salaries with national averages. We report associate professor salaries for time in rank of 7 years or less, and of more than 7 years. For full professors, we report time in rank of 7 years or less, 8 to 15 years, and more than 15 years. We also disaggregate teaching faculty salaries into the two subclasses, Teaching Professors and Other Instructors. Within each subclass, there is further breakdown into persons with time in rank of less than 3 years, 3-5 years, 6-8 years, and 9 or more years. The teaching faculty salary disaggregations are in Tables S1a to S19a.

The U.S. CS data is stratified in three stratification dimensions: (1) public vs. private educational institution; (2) tenure-track faculty size of the unit offering the computing program; and (3) type of locale of the institution. These have been the dimensions in use since 2011. Box and whisker diagrams for each faculty type and rank, including time in rank for associate and full professors, compare salaries along each of the three dimensions (Figures S1-S9). The strata for tenure-track faculty size were chosen so that each is highly likely to have a sufficient number of programs reporting; this is the fourth year we are using the current

Table S1. Nine-month Salaries, 133 Responses of 193 US CS Departments, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
Depts	118	116	118	133	104	125	131	130	121	38	48
Indiv	716	582	669	2,030	373	664	1,062	1,310	1,366	270	371
10	$138,806	$134,983	$130,956	$138,109	$103,369	$109,147	$108,000	$96,570	$66,738	$59,772	$47,956
25	$160,448	$152,211	$144,953	$154,778	$111,281	$118,077	$116,237	$103,260	$76,668	$74,968	$53,940
50	$188,053	$176,358	$160,492	$176,008	$122,758	$129,631	$127,467	$114,072	$88,862	$86,004	$64,050
75	$221,389	$200,668	$190,302	$198,999	$136,451	$144,300	$143,428	$124,520	$103,620	$126,325	$70,536
90	$247,681	$223,868	$217,777	$217,510	$144,511	$156,328	$154,575	$131,652	$119,209	$156,933	$72,509

Table S1a. Nine-month Salaries, 133 Responses of 193 US CS Departments, Percentiles from Department Averages

	Teaching Professor					Other Instructor				
	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years
Depts	53	52	59	63	97	30	29	30	43	73
Indiv	163	126	204	218	874	70	57	85	122	492
10	$74,861	$74,362	$69,838	$71,766	$71,639	$56,716	$56,800	$58,039	$51,400	$53,432
25	$89,373	$88,757	$81,104	$80,000	$84,577	$66,189	$68,370	$65,724	$64,606	$63,976
50	$100,873	$102,245	$92,450	$92,318	$93,371	$83,383	$77,969	$81,252	$74,544	$79,770
75	$132,314	$119,368	$105,925	$102,320	$112,509	$104,239	$94,448	$93,347	$87,979	$87,923
90	$149,770	$132,073	$128,060	$112,790	$125,635	$115,839	$111,160	$101,217	$100,154	$108,115

strata. Note that the strata overlap, so that most departmental data affect multiple strata. This may be especially useful to a department near the boundary of one stratum. For type of locale, we have three strata for public institutions (large city and associated suburbs [population >= 250,000], mid-size city and associated suburbs [population between 100,000 and 250,000], or small city/rural locale [population less than 100,000]) and two strata for private institutions (large city and suburbs, or not). The classification of an educational institution into a locale stratum was performed using the Carnegie Classification database.

Those departments reporting salary data were provided a summary report earlier this year, In the salary report, those departments that provided individual salaries were additionally provided more comprehensive distributional information based on these individual salaries.

Overall, we had a response rate of 55 percent, while last year's overall response rate was 61 percent. Among U.S. CS departments, the response rate was 65 percent compared with 74 percent last year. Still, this represents data from 131 U.S. CS departments. We had the highest response rate from the U.S. Information departments (70 percent, vs 68 percent last year), though this represented only one more department than last year. Canadian department responses were up from 24 to 28 percent, but this also represented only one more department than last year. The CE response rate was down from 14 to 11 percent, but this represented only one less department response than we had last year. Of those departments reporting this year, 62 percent provided individual salary data. This is the same percentage as did so last year.

Salaries at private institutions tend to be higher than those at public institutions for all faculty types (Tables S2 and S3). This pattern is consistent with data from previous years.

Table S2. Nine-month Salaries, 98 Responses of 141 US CS Public (All Public), Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
Depts	89	87	95	108	80	91	96	95	89	27	31
Indiv	511	431	484	1,533	283	466	774	969	983	189	171
10	$125,705	$133,978	$121,248	$128,994	$101,658	$106,884	$105,434	$95,181	$63,425	$41,727	$47,476
25	$152,825	$145,977	$138,836	$149,291	$110,156	$116,733	$113,692	$101,467	$72,255	$69,375	$52,800
50	$175,843	$166,212	$150,789	$162,993	$119,572	$127,035	$123,524	$110,537	$85,953	$84,000	$60,967
75	$201,661	$192,185	$176,903	$181,974	$135,485	$138,632	$138,428	$121,957	$94,468	$110,761	$66,605
90	$224,003	$206,769	$189,745	$200,021	$142,235	$150,367	$148,605	$127,361	$115,825	$143,332	$70,333

Table S2a. Nine-month Salaries, 98 Responses of 139 US CS Public (All Public), Percentiles from Department Averages

	Teaching Professor					Other Instructor				
Non-Tenure Track	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years
Depts	34	33	37	42	67	26	25	25	32	60
Indiv	102	83	142	124	598	59	50	69	97	385
10	$74,422	$72,503	$67,464	$69,833	$70,085	$55,872	$60,539	$57,506	$51,595	$54,572
25	$80,411	$81,200	$71,690	$77,529	$81,695	$64,343	$68,370	$64,000	$63,326	$63,863
50	$94,982	$93,668	$84,350	$86,598	$90,667	$79,727	$74,493	$75,348	$71,048	$76,165
75	$119,019	$110,906	$102,377	$98,066	$106,697	$95,353	$87,366	$90,323	$85,964	$85,657
90	$149,334	$123,326	$124,640	$104,453	$119,632	$107,789	$103,524	$96,067	$99,650	$104,658

When viewed relative to faculty size, salaries tend to be higher for larger departments at both public and private institutions (perhaps best seen in Figures S1-S9). This pattern holds for all tenure-track ranks except for full professors in rank 8-15 years, where the median salary in private institutions is about the same across all department sizes, and assistant and associate professors, where the median salary in the next-to-largest public department category is lower than the previous group. As was the case last year, the pattern also generally holds for teaching faculty and postdoc salaries; few smaller departments reported research faculty this year, so there is little pattern to observe. When teaching faculty are separated into Teaching Professors and Other Instructors, the pattern of higher salaries at larger departments also generally holds except for some comparisons involving departments of size less than 15.

When viewed relative to type of locale, public institution salaries appear to be generally lower in smaller locales than in mid-size or large cities for all tenure-track faculty ranks. Private institution salaries exhibit the same pattern except for senior faculty with longer longevity in rank. Teaching faculty salaries at public institutions are similar across the various locales, while at private institutions they tend to be higher in large cities than in smaller locales.

Our analysis of faculty salary changes from one year to the next uses only those departments that reported both years; otherwise, the departments that reported during only one year can skew the comparison. Because some departments that reported both years provided only aggregate salaries for their full and associate professors during one year and in the other year reported them by years in rank, we do not disaggregate salary changes by years in rank for full professors and associate professors in the year-to-year comparison. Similarly, we do not

Table S3. Nine-month Salaries, 35 Responses of 52 US CS Private (All Private), Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
Depts	33	27	31	35	24	34	35	35	32	11	17
Indiv	200	153	209	562	90	198	288	341	383	81	200
10	$151,951	$163,422	$147,758	$152,880	$115,137	$119,265	$120,149	$108,717	$85,853	$75,368	$49,475
25	$176,727	$177,932	$161,855	$177,925	$121,170	$132,349	$127,233	$113,222	$92,984	$84,818	$68,100
50	$222,498	$195,877	$183,410	$200,075	$131,152	$142,058	$141,441	$120,276	$102,847	$107,262	$70,594
75	$247,800	$223,868	$217,385	$218,329	$139,627	$150,765	$150,696	$132,660	$115,419	$153,837	$72,444
90	$261,225	$248,032	$225,000	$240,848	$147,786	$170,354	$158,771	$139,479	$128,998	$162,970	$73,428

Table S3a. Nine-month Salaries, 35 Responses of 53 US CS Private (All Private), Percentiles from Department Averages

	Teaching Professor					Other Instructor				
	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years
Depts	19	19	22	21	30	4	4	5	11	13
Indiv	61	43	62	94	276	11	7	16	25	107
10	$87,735	$84,673	$83,039	$82,800	$85,714				$53,000	$56,500
25	$99,354	$98,330	$90,126	$92,318	$93,278				$72,522	$74,544
50	$112,974	$117,580	$98,644	$100,000	$107,847	$115,004	$103,512	$94,333	$84,741	$87,923
75	$140,460	$122,109	$112,190	$111,500	$122,504				$94,296	$100,727
90	$149,107	$135,546	$129,207	$115,825	$129,006				$99,140	$114,393

Table S4. Nine-month Salaries, 14 Responses of US CS Public With <=15 Tenure-Track Faculty, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
Depts	10	12	10	14	8	11	12	12	9	0	2
Indiv	23	23	23	70	17	26	43	49	53		
10	$96,550	$120,476	$113,693	$114,543	$0	$90,519	$93,609	$90,745			
25	$134,943	$123,591	$117,643	$118,255	$100,428	$96,037	$101,407	$92,551	$70,526		
50	$143,143	$140,227	$130,407	$140,705	$107,606	$105,034	$106,408	$95,226	$74,167		
75	$144,180	$151,517	$132,784	$150,394	$110,577	$113,782	$110,612	$98,922	$84,925		
90	$158,941	$175,023	$147,142	$157,986	$0	$119,613	$118,531	$104,523			

Table S4a. Nine-month Salaries, 14 Responses of US CS Public With <=15 Tenure-Track Faculty, Percentiles from Department Averages

	Teaching Professor					Other Instructor				
	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years
Depts	2	3	5	5	6	4	4	2	5	7
Indiv			7	12	27	7	4		7	26
10										
25										$61,751
50			$70,215	$84,804	$79,372	$74,034	$67,624		$70,000	$70,000
75										$86,779
90										

Table S5. Nine-month Salaries, 29 Responses of US CS Public With 10 < Tenure-Track Faculty <=20, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
Depts	23	22	26	29	23	26	28	28	26	3	5
Indiv	48	64	81	204	52	78	135	139	153	0	9
10	$117,658	$129,526	$118,141	$115,837	$95,851	$103,847	$102,284	$89,800	$57,013		
25	$134,448	$134,765	$123,178	$133,765	$103,636	$106,001	$105,570	$94,129	$61,429		
50	$143,514	$143,722	$133,368	$153,920	$110,100	$115,292	$112,860	$100,102	$67,281		$56,000
75	$181,353	$170,866	$147,480	$165,217	$119,511	$119,970	$119,382	$106,779	$78,781		
90	$223,067	$198,010	$174,409	$179,950	$124,979	$129,855	$130,971	$114,117	$89,357		

Table S5a. Nine-month Salaries, 29 Responses of US CS Public With 10 < Tenure-Track Faculty <=20, Percentiles from Department Averages

	Teaching Professor					Other Instructor				
	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years
Depts	6	7	8	13	15	10	10	7	12	22
Indiv	8	12	16	27	63	15	14	19	20	90
10				$62,360	$63,364	$47,730	$40,472		$27,850	$44,530
25		$69,762	$65,951	$70,000	$68,369	$55,382	$61,312	$57,613	$50,500	$57,245
50	$68,652	$75,356	$69,594	$79,688	$79,021	$68,685	$69,252	$62,043	$59,333	$64,233
75		$90,993	$73,749	$87,113	$89,394	$83,352	$72,708	$74,485	$72,499	$77,405
90				$91,768	$92,900	$94,064	$74,841		$74,940	$91,940

Table S6. Nine-month Salaries, 29 Responses of US CS Public With 15 < Tenure-Track Faculty <=25, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
Depts	23	24	24	29	26	26	29	28	28	4	3
Indiv	60	81	84	235	68	80	155	172	145	42	0
10	$128,094	$120,748	$123,085	$128,615	$98,513	$106,295	$104,402	$91,061	$59,137		
25	$138,744	$134,429	$131,142	$137,128	$105,957	$114,524	$112,333	$100,304	$63,319		
50	$165,878	$154,543	$144,466	$161,276	$117,138	$118,995	$117,425	$103,634	$69,369	$78,750	
75	$185,339	$170,666	$153,570	$172,271	$124,745	$128,763	$126,887	$113,179	$81,998		
90	$223,067	$198,540	$183,662	$181,067	$132,646	$134,098	$133,103	$117,928	$85,688		

Table S6a. Nine-month Salaries, 29 Responses of US CS Public With 15 < Tenure-Track Faculty <=25, Percentiles from Department Averages

	Teaching Professor					Other Instructor				
Non-Tenure Track	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years
Depts	6	5	5	9	14	10	10	9	11	22
Indiv	6	9	12	16	49	15	16	24	19	96
10					$66,105	$47,730	$40,472		$25,500	$44,530
25				$70,000	$69,216	$59,153	$68,403	$58,146	$52,973	$58,238
50	$75,309	$81,200	$70,000	$79,688	$80,258	$75,125	$71,806	$64,000	$60,666	$67,280
75				$82,873	$83,705	$89,423	$77,100	$78,500	$74,682	$79,668
90					$89,408	$94,064	$87,879		$77,429	$86,065

Table S7. Nine-month Salaries, 22 Responses of US CS Public With 20 < Tenure-Track Faculty <=35, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
Depts	18	21	19	22	24	28	28	29	20	11	10
Indiv	78	56	77	224	87	106	197	203	125	26	28
10	$136,598	$126,385	$135,914	$140,691	$101,525	$104,542	$104,470	$93,622	$69,154	$37,923	$48,221
25	$160,506	$146,312	$142,168	$149,838	$107,808	$109,919	$110,524	$96,325	$69,662	$71,199	$49,807
50	$176,941	$158,684	$156,601	$165,681	$114,170	$117,531	$117,059	$99,868	$76,032	$88,592	$55,336
75	$201,792	$174,810	$172,687	$177,905	$121,316	$125,671	$124,224	$107,496	$82,332	$105,211	$59,340
90	$215,190	$193,821	$201,705	$195,550	$127,500	$133,703	$128,507	$113,601	$92,452	$113,712	$64,540

Table S7a. Nine-month Salaries, 22 Responses of US CS Public With 20 < Tenure-Track Faculty <=35, Percentiles from Department Averages

	Teaching Professor					Other Instructor				
	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years
Depts	8	8	8	10	16	3	5	5	6	12
Indiv	16	11	29	30	99		7	13	9	48
10				$69,483	$70,846					$70,177
25	$85,492	$76,581	$72,673	$71,904	$77,488					$78,429
50	$89,460	$85,600	$76,703	$81,112	$83,619		$92,500	$84,004	$84,348	$84,752
75	$92,880	$97,978	$84,676	$89,538	$91,908					$91,601
90				$95,750	$100,709					$108,196

Table S8. Nine-month Salaries, 46 Responses of US CS Public With Tenure-Track Faculty >30, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
Depts	44	44	44	46	37	45	46	46	44	21	23
Indiv	402	308	308	1,070	170	322	510	665	728	141	156
10	$162,746	$156,942	$150,155	$160,357	$110,750	$117,581	$115,424	$103,874	$76,582	$63,870	$49,030
25	$178,958	$170,297	$156,894	$173,089	$118,534	$125,236	$124,690	$112,143	$87,357	$74,835	$55,538
50	$197,977	$194,558	$180,201	$189,489	$135,325	$134,875	$136,066	$121,189	$92,028	$84,529	$62,500
75	$215,435	$206,723	$192,817	$202,042	$142,000	$148,662	$144,363	$126,133	$105,630	$115,418	$68,537
90	$232,181	$224,780	$217,578	$211,753	$148,884	$156,640	$155,025	$129,603	$119,214	$145,408	$71,585

Table S8a. Nine-month Salaries, 46 Responses of US CS Public With Tenure-Track Faculty >30, Percentiles from Department Averages

	Teaching Professor					Other Instructor				
	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years
Depts	22	20	23	21	40	11	9	12	14	27
Indiv	85	63	113	76	478	36	28	35	67	250
10	$79,239	$85,001	$73,152	$77,031	$85,671	$63,541		$61,845	$64,550	$61,720
25	$94,337	$91,839	$83,656	$82,667	$90,172	$73,120	$73,620	$66,491	$66,464	$69,489
50	$108,940	$105,896	$99,865	$95,160	$103,253	$93,088	$83,369	$74,433	$78,312	$80,869
75	$143,099	$118,526	$106,608	$101,908	$115,301	$106,838	$94,448	$93,249	$86,440	$89,165
90	$153,330	$132,051	$127,600	$112,800	$130,761	$115,805		$105,707	$98,136	$107,549

Table S9. Nine-month Salaries, 13 Responses of US CS Private With <=20 Tenure-Track Faculty, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
Depts	11	6	10	13	10	12	13	13	11	1	4
Indiv	42	18	39	99	23	33	56	68	63	0	19
10	$144,523	$0	$150,112	$152,201	$114,632	$119,523	$121,658	$108,461	$82,801		
25	$155,209	$0	$165,476	$162,919	$115,813	$129,896	$124,131	$112,333	$90,017		
50	$190,396	$196,021	$182,815	$197,167	$124,037	$136,363	$132,518	$117,624	$93,371		$68,550
75	$240,116	$0	$221,011	$204,484	$134,512	$149,567	$148,717	$130,521	$110,680		
90	$247,800	$0	$229,443	$217,052	$138,356	$155,442	$154,838	$136,760	$118,183		

Table S9a. Nine-month Salaries, 13 Responses of US CS Private With <=20 Tenure-Track Faculty, Percentiles from Department Averages

	Teaching Professor					Other Instructor				
Non-Tenure Track	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years
Depts	8	7	8	9	12	0	0	0	0	0
Indiv	14	10	17	22	63					
10					$82,423					
25	$93,916	$93,501	$82,663	$92,100	$86,251					
50	$101,947	$101,660	$90,627	$92,430	$93,309					
75	$110,062	$116,007	$102,834	$107,725	$108,232					
90					$117,923					

Table S10. Nine-month Salaries, 13 Responses of US CS Private With 15 < Tenure-Track Faculty <=30, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
Depts	12	11	11	13	8	12	13	13	11	3	5
Indiv	54	40	58	152	22	53	75	94	92	0	49
10	$162,018	$169,408	$163,568	$176,048		$119,208	$123,158	$111,499	$85,833		
25	$173,651	$176,276	$171,211	$189,886	$127,845	$129,717	$132,518	$116,554	$90,647		
50	$223,321	$195,877	$183,410	$197,479	$131,019	$138,799	$135,000	$119,523	$100,410		$70,630
75	$242,076	$216,873	$207,815	$217,578	$135,482	$151,079	$148,717	$130,521	$113,080		
90	$249,658	$248,998	$251,893	$244,547		$164,873	$158,388	$136,760	$135,603		

Table S10a. Nine-month Salaries, 13 Responses of US CS Private With 15 < Tenure-Track Faculty <=30, Percentiles from Department Averages

	Teaching Professor					Other Instructor				
	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years
Depts	7	5	9	7	11	1	2	3	4	4
Indiv	13	9	18	25	69				8	23
10					$82,381					
25	$95,070		$89,301	$94,775	$91,336					
50	$109,091	$111,113	$94,476	$102,732	$105,784				$85,000	$90,776
75	$131,555		$124,290	$106,413	$120,207					
90					$135,603					

Table S11. Nine-month Salaries, 22 Responses of US CS Private With Tenure-Track Faculty >20, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
Depts	22	21	21	22	14	22	22	22	21	10	13
Indiv	158	135	170	463	67	165	232	273	320	78	181
10	$163,249	$165,488	$147,758	$157,563	$122,483	$119,531	$120,119	$109,835	$86,037	$75,283	$52,129
25	$204,504	$177,537	$160,141	$186,899	$127,272	$133,551	$131,053	$117,237	$94,630	$84,695	$69,246
50	$225,387	$192,623	$183,410	$200,433	$134,654	$142,746	$142,928	$124,941	$106,844	$118,154	$70,630
75	$252,957	$224,150	$215,718	$221,306	$143,053	$153,206	$153,299	$135,376	$115,367	$156,707	$72,444
90	$271,464	$247,388	$220,631	$250,137	$155,827	$174,953	$165,492	$142,800	$129,243	$164,354	$72,525

Table S11a. Nine-month Salaries, 22 Responses of US CS Private With Tenure-Track Faculty >20, Percentiles from Department Averages

	Teaching Professor					Other Instructor				
	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years
Depts	11	12	14	12	18	4	4	5	11	13
Indiv	47	33	45	72	213	11	7	16	25	107
10	$92,850	$88,280	$90,854	$88,103	$94,292				$53,000	$56,500
25	$113,921	$108,151	$96,547	$96,674	$104,314				$72,522	$74,544
50	$129,261	$120,345	$105,606	$103,728	$114,341	$115,004	$103,512	$94,333	$84,741	$87,923
75	$143,033	$124,904	$112,190	$112,581	$125,319				$94,296	$100,727
90	$148,850	$134,855	$126,922	$119,072	$129,091				$99,140	$114,393

Table S12. Nine-month Salaries, 40 Responses of US CS Public In Large City or Suburbs, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
Depts	36	38	38	40	34	38	40	39	36	12	13
Indiv	224	167	197	612	123	222	353	373	419	105	94
10	$141,010	$138,737	$128,075	$143,573	$105,355	$107,527	$108,048	$98,310	$62,785	$64,358	$53,324
25	$161,489	$144,389	$144,953	$157,034	$111,169	$116,701	$114,343	$102,248	$71,935	$73,314	$56,000
50	$179,846	$172,774	$162,309	$171,172	$125,997	$128,546	$125,849	$111,976	$85,814	$84,236	$60,967
75	$206,521	$201,794	$190,490	$196,483	$138,593	$142,292	$138,547	$122,059	$93,897	$108,433	$67,000
90	$212,265	$214,285	$193,872	$203,321	$141,967	$156,484	$149,316	$126,740	$109,340	$142,409	$71,206

Table S12a Nine-month Salaries, 40 Responses of US CS Public In Large City or Suburbs, Percentiles from Department Averages

	Teaching Professor					Other Instructor				
Non-Tenure Track	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years
Depts	18	17	19	20	29	10	8	9	10	22
Indiv	47	41	78	67	294	29	18	25	30	125
10	$71,404	$74,914	$66,626	$69,653	$69,791	$52,106			$55,045	$44,274
25	$90,453	$85,446	$70,845	$72,912	$78,324	$65,246	$57,011	$66,875	$64,564	$58,235
50	$99,795	$99,275	$83,000	$84,557	$89,359	$87,431	$79,513	$78,500	$73,215	$69,667
75	$138,975	$109,195	$102,364	$100,904	$103,089	$102,749	$88,650	$85,732	$86,991	$85,249
90	$148,446	$126,871	$110,722	$104,614	$115,491	$106,345			$94,047	$87,671

Table S13. Nine-month Salaries, 21 Responses of US CS Public In Midsize City or Suburbs, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
Depts	17	16	16	19	15	18	19	19	18	6	5
Indiv	130	110	91	345	47	95	147	205	214	49	25
10	$163,746	$142,312	$130,696	$149,947	$105,493	$114,072	$111,755	$98,405	$66,096		
25	$173,291	$154,948	$144,719	$159,749	$112,475	$120,289	$118,046	$105,078	$75,288		
50	$213,640	$172,841	$157,966	$182,999	$118,275	$129,556	$124,964	$114,115	$85,870	$68,845	$60,000
75	$239,089	$199,126	$188,592	$206,740	$126,297	$146,681	$146,216	$124,572	$92,017		
90	$248,218	$207,963	$199,341	$221,992	$141,012	$157,864	$165,790	$138,222	$144,412		

Table S13a. Nine-month Salaries, 21 Responses of US CS Public In Midsize City or Suburbs, Percentiles from Department Averages

	Teaching Professor					Other Instructor				
	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years
Depts	5	6	5	6	11	5	6	5	8	13
Indiv	35	27	19	23	123	11	15	16	29	91
10					$80,000					$64,249
25					$85,869				$63,505	$67,005
50	$96,270	$89,841	$87,350	$80,368	$89,430	$81,204	$75,790	$90,323	$74,682	$73,611
75					$113,282				$86,510	$88,182
90					$148,880					$102,111

Table S14. Nine-month Salaries, 36 Responses of US CS Public in Small City, Town, or Rural, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
Depts	31	32	30	36	28	32	34	34	32	8	11
Indiv	156	143	155	479	101	132	245	361	336	32	48
10	$127,627	$121,226	$123,275	$124,560	$96,893	$105,219	$103,225	$92,001	$61,582		$44,252
25	$143,125	$137,961	$138,824	$141,303	$108,896	$114,544	$110,687	$100,008	$74,810	$77,040	$47,819
50	$173,687	$164,951	$152,159	$163,664	$114,971	$122,605	$120,379	$109,126	$85,439	$81,594	$62,500
75	$196,911	$188,643	$172,200	$180,541	$125,996	$132,073	$133,801	$118,601	$94,681	$105,478	$64,000
90	$218,805	$200,319	$197,109	$196,475	$144,049	$144,070	$142,999	$126,792	$105,094		$68,638

Table S14a. Nine-month Salaries, 36 Responses of US CS Public in Small City, Town, or Rural, Percentiles from Department Averages

	Teaching Professor					Other Instructor				
	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years
Depts	10	10	12	14	25	10	9	10	12	23
Indiv	19	15	43	31	175	18	15	25	36	161
10	$73,506	$68,137	$68,128	$69,380	$70,987	$54,541		$53,308	$51,595	$57,259
25	$76,682	$74,350	$71,219	$82,719	$83,790	$58,695	$68,503	$58,321	$59,736	$67,245
50	$88,790	$92,500	$82,285	$89,025	$92,387	$71,313	$73,620	$74,433	$70,108	$79,770
75	$93,307	$111,832	$95,480	$94,722	$106,650	$90,833	$80,721	$82,463	$76,668	$84,189
90	$116,469	$117,181	$105,960	$109,995	$119,844	$98,078		$95,532	$83,686	$100,550

Table S15. Nine-month Salaries, 24 Responses of US CS Private in Large City or Suburbs, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
Depts	22	17	22	24	17	24	24	24	22	8	11
Indiv	136	104	167	407	75	156	231	259	315	73	145
10	$150,635	$163,422	$150,429	$150,627	$113,129	$123,558	$120,935	$108,689	$85,853		$48,681
25	$167,796	$178,327	$168,817	$174,377	$117,812	$133,032	$127,969	$115,943	$92,899	$99,118	$67,010
50	$211,537	$192,623	$185,626	$196,625	$128,927	$142,058	$141,907	$122,245	$103,744	$118,154	$69,246
75	$228,604	$224,150	$218,218	$216,770	$143,828	$151,512	$152,556	$134,794	$115,524	$160,426	$72,472
90	$248,970	$248,032	$224,940	$223,483	$152,841	$170,354	$158,821	$139,544	$126,165		$74,773

Table S15a. Nine-month Salaries, 24 Responses of US CS Private in Large City or Suburbs, Percentiles from Department Averages

	Teaching Professor					Other Instructor				
Non-Tenure Track	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 v	All years	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years
Depts	14	16	16	16	21	4	3	4	8	9
Indiv	53	39	53	79	224	11		12	18	91
10	$89,952	$82,181	$87,246	$85,069	$86,037					
25	$103,461	$94,250	$94,357	$94,275	$92,632				$78,636	$83,843
50	$121,593	$114,347	$106,462	$103,728	$110,583	$115,004		$97,469	$89,167	$93,629
75	$140,941	$121,697	$125,230	$111,813	$123,156				$96,035	$100,727
90	$148,487	$133,680	$132,795	$116,145	$128,964					

Table S16. Nine-month Salaries, 11 Responses of US CS Private in Other than Large City, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
Depts	11	10	9	11	7	10	11	11	10	3	6
Indiv	64	49	42	155	15	42	57	82	68	0	55
10	$164,423	$166,882		$155,834		$117,512	$120,109	$109,487	$87,369		
25	$204,664	$182,194	$160,141	$190,564	$126,369	$119,284	$122,773	$111,812	$93,137		
50	$247,630	$203,862	$180,000	$204,484	$133,376	$138,463	$133,376	$117,624	$99,211		$70,982
75	$260,239	$220,790	$191,230	$224,469	$135,629	$149,800	$147,162	$130,880	$109,332		
90	$272,529	$231,268		$249,584		$157,946	$153,935	$136,695	$134,856		

Table S16a. Nine-month Salaries, 11 Responses of US CS Private in Other than Large City, Percentiles from Department Averages

	Teaching Professor					Other Instructor				
	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years
Depts	5	3	6	5	9	0	1	1	3	4
Indiv	8		9	15	52					16
10										
25					$93,371					
50	$101,430		$90,627	$92,430	$105,784					$79,211
75					$110,514					
90										

Table S17. Nine-month Salaries, 4 Responses of 35 US Computer Engineering Departments, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
Depts	2	4	4	4	2	3	3	4	4	1	1
Indiv	0	10	13	29	0	0	0	17	9	0	0
10											
25											
50		$152,769	$157,788	$166,477				$97,824	$77,500		
75											
90											

Table S17a. Nine-month Salaries, 4 Responses of 35 US Computer Engineering Departments, Percentiles from Department Averages

	Teaching Professor					Other Instructor				
	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years
Depts	1	4	1	0	4	0	0	0	0	0
Indiv		5			9					
10										
25										
50		$77,500			$77,500					
75										
90										

Table S18. Nine-month Salaries, 16 Responses of 22 US Information Departments, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
Depts	11	15	16	16	13	16	16	16	14	7	5
Indiv	45	66	88	199	45	111	156	192	228	25	25
10	$167,146	$149,551	$126,445	$138,896	$101,667	$107,409	$106,320	$89,189	$73,077		
25	$186,080	$160,668	$142,427	$156,644	$109,791	$113,700	$113,309	$100,903	$82,488	$72,757	
50	$186,573	$173,464	$156,164	$174,527	$121,599	$122,434	$122,958	$109,678	$94,734	$74,835	$61,200
75	$212,001	$195,632	$175,507	$181,075	$154,502	$138,205	$140,442	$115,626	$100,701	$78,357	
90	$228,727	$222,122	$198,317	$191,322	$160,901	$150,254	$153,273	$125,898	$101,543		

Table S18a. Nine-month Salaries, 16 Responses of 29 US Information Departments, Percentiles from Department Averages

	Teaching Professor					Other Instructor				
Non-Tenure Track	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years
Depts	7	6	8	7	11	1	1	2	5	9
Indiv	28	15	47	52	173				9	55
10					$72,966					
25	$84,906		$81,098	$82,184	$88,954					$65,619
50	$92,850	$105,431	$87,962	$89,604	$95,576				$74,952	$75,299
75	$99,380		$97,247	$99,217	$103,221					$90,440
90					$108,233					

Table S19. Twelve-month Salaries, 8 Responses of 29 Canadian Departments, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
Depts	4	5	6	7	5	6	7	7	6	2	3
Indiv	24	37	40	122	22	31	63	78	53	0	0
10											
25				$163,573			$137,213	$115,440			
50	$217,844	$169,685	$172,001	$179,147	$153,815	$136,794	$156,280	$124,597	$115,103		
75				$215,830			$176,332	$147,676			
90											

Table S19a. Twelve-month Salaries, 8 Responses of 30 Canadian Departments, Percentiles from Department Averages

	Teaching Professor					Other Instructor				
Non-Tenure Track	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years
Depts	3	1	3	3	5	0	1	1	2	3
Indiv					42					
10										
25										
50					$117,291					
75										
90										

Table S20. Nine-month Salaries for New PhDs (Twelve-month for Canadian)

	US (CS, CE, and Info Combined)						Canadian					
	Tenure-Track	Teaching Prof	Other Instructor	Non-ten Teach All	Non-ten Research	Postdoc	Tenure-Track	Teaching Prof	Other Instructor	Non-ten Teach All	Non-ten Research	Postdoc
Depts	68	28	9	34	3	31	2	1	1	1	0	1
Indiv	163	45	11	56	8	133						
10	$100,000	$68,134		$66,500		$48,554						
25	$109,260	$80,000	$70,000	$79,534		$48,554						
50	$118,667	$95,000	$74,412	$88,000		$52,500						
75	$125,000	$100,638	$96,000	$100,638		$70,640						
90	$134,983	$116,540		$108,963		$77,016						

Table S21. Change in Salary Median for Departments that Reported in Both 2020 and 2021

	U.S. CS	U.S. CE	U.S. I	Canadian
Departments	124	3	15	5
Full Profs	4.30%		8.30%	-5.30%
Assoc. Profs.	3.40%		-0.50%	-8.70%
Asst. Profs.	2.50%		2.10%	-2.80%
Teaching Prof	3.00%		2.40%	17.70%
Other Instructors	2.70%		7.40%	17.60%
Research faculty	-17.00%		-0.60%	14.60%
Post doctorates	7.20%		6.40%	-3.80%

disaggregate teaching faculty by years in rank in the year to year comparison, though we do distinguish teaching professors from other instructors.

Table S21 shows, by type of faculty and type of department, the change in the median of the average salaries from departments that reported both years. The number of departments being compared is indicated at the top of each column. Using the cell showing full professors at U.S. CS departments as an example, the table indicates that the median of the 124 average salaries for full professors was 4.3 per cent higher in 2021 than was the median of the average full professor salaries in 2020 from these same 124 departments.

When interpreting salary changes, it is important to remember the effect that promotions have on the departmental data from one year to the next, since a promotion causes an individual faculty member to move from one rank to another. Thus, a department with a small number of faculty members in a particular rank can have its average salary in that rank change appreciably (in either direction) by a single promotion to or from that rank. Departures via resignation or retirement also impact these figures, particularly in the non-tenure-track categories. Because of the small number of Canadian schools, Information schools, and Computer Engineering departments reporting, the values in those columns are considerably more volatile; this is evident in several of the entries in Table S21.

For new Ph.D.s in tenure-track positions at U.S. computer science, computer engineering, and I-school departments the median of the average 9-month salaries was $118,667, an increase of 2.2 per cent over last year (Table S20). Median of the

average 12-month salaries at Canadian institutions was $101,300 CDN. However, only two institutions reported such data and only four did so last year, so it is not clear how representative this value is across the population of Canadian doctoral-granting institutions, and no comparison is made between 2020 and 2021 for Canadian institutions.

Table S22 shows the median course rate paid to adjuncts at different types of institutions. The table's columns also distinguish between courses taught to undergraduate and graduate students, and courses taught by an adjunct with a Ph.D. and those with a master's degree. Adjunct salaries were higher at private universities than at public universities, similar to the situation for other faculty salaries. Within public universities, large and mid-sized cities tended to have lower salaries than smaller cities or rural locations. Also of note is that, for the U.S. CS departments aggregated, the median of the averages was higher among those with master's degrees who taught undergrad courses than those who taught grad courses, although both sets of these medians salaries for those with master's degrees were below the respective medians for adjuncts with Ph.D.s.

Department Profiles

Every three years, the Taulbee Survey collects data about elements of departmental activities that are not expected

Table S22. Median value for an adjunct teaching a single course.

Group	Median PhD teaching undergrad	N PhD teaching undergrad	Median PhD teaching grad	N PhD teaching grad	Median MS teaching undergrad	N MS teaching undergrad	Median MS teaching grad	N MS teaching grad
US CS	$7,566	82	$7,500	79	$6,500	78	$6,000	67
US CE	--	3	--	3	--	2	--	2
US IN	$6,000	12	$6,250	12	$6,000	11	$6,000	9
Canadian	--	2	--	1	--	2	--	1
US CS Public	$6,525	63	$6,250	58	$6,000	61	$6,000	51
US CS Private	$9,000	19	$9,000	21	$9,000	17	$8,500	16
Pub large city	$6,250	32	$6,000	28	$5,925	30	$5,570	24
Pub mid city	$6,000	9	$6,000	9	$5,250	8	$4,500	6
Pub small/rurl	$8,000	22	$8,000	21	$7,500	23	$7,000	21
Priv large city	$9,000	13	$9,389	16	$8,800	14	$8,500	14
Private other	$9,000	6	$8,000	5	--	3	--	2

Table S23. Adjunct rate adjustments.

Group	% Adj Time at Dept	% Adj Expertise
US CS	46%	53%
US CE	--%	--%
US IN	50%	64%
CAN	--%	--%
US CS Pub	39%	48%
US CS Priv	63%	69%

Table S23a. Other reasons for adjunct rate adjustments.

# Depts	Reason
4	Course enrollment or credit hours
4	Prior research or industry experience
3	Prior teaching experience at other institutions
3	Promotion within ranks of adjunct or other admin factors
3	Demand vs. availability for the subject
2	Collective bargaining agreement
1	Course difficulty/level

Figure S1. US CS Department Average Salary, Full Professor in Rank 16+ Years

CRA Taulbee Survey 2021

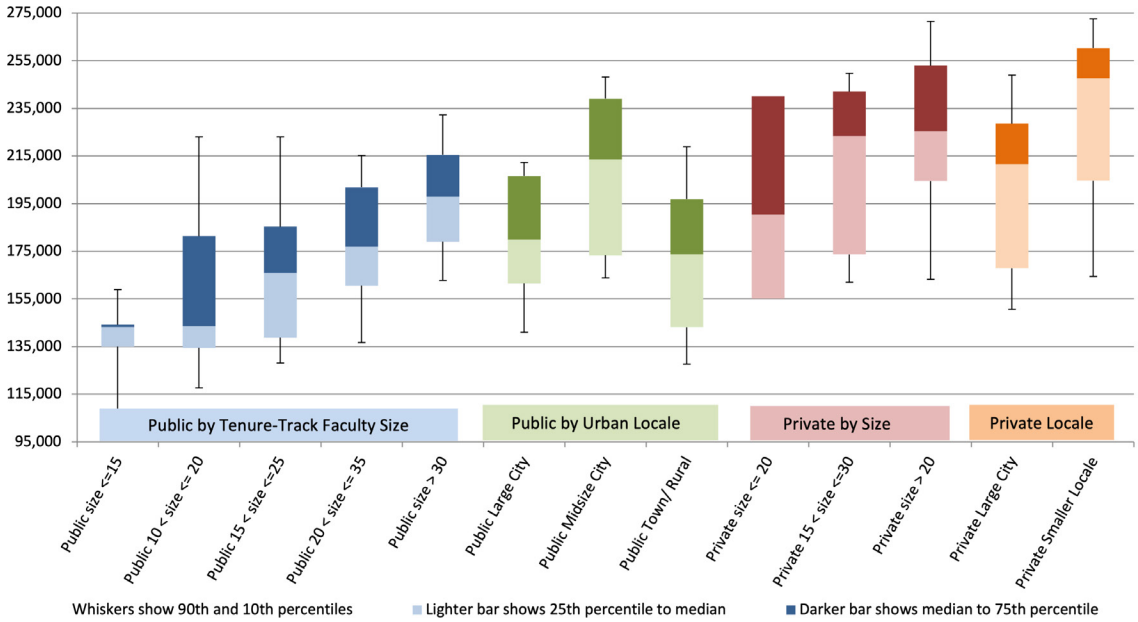


Figure S2. US CS Department Average Salary, Full Professor in Rank 8-15 Years

CRA Taulbee Survey 2021

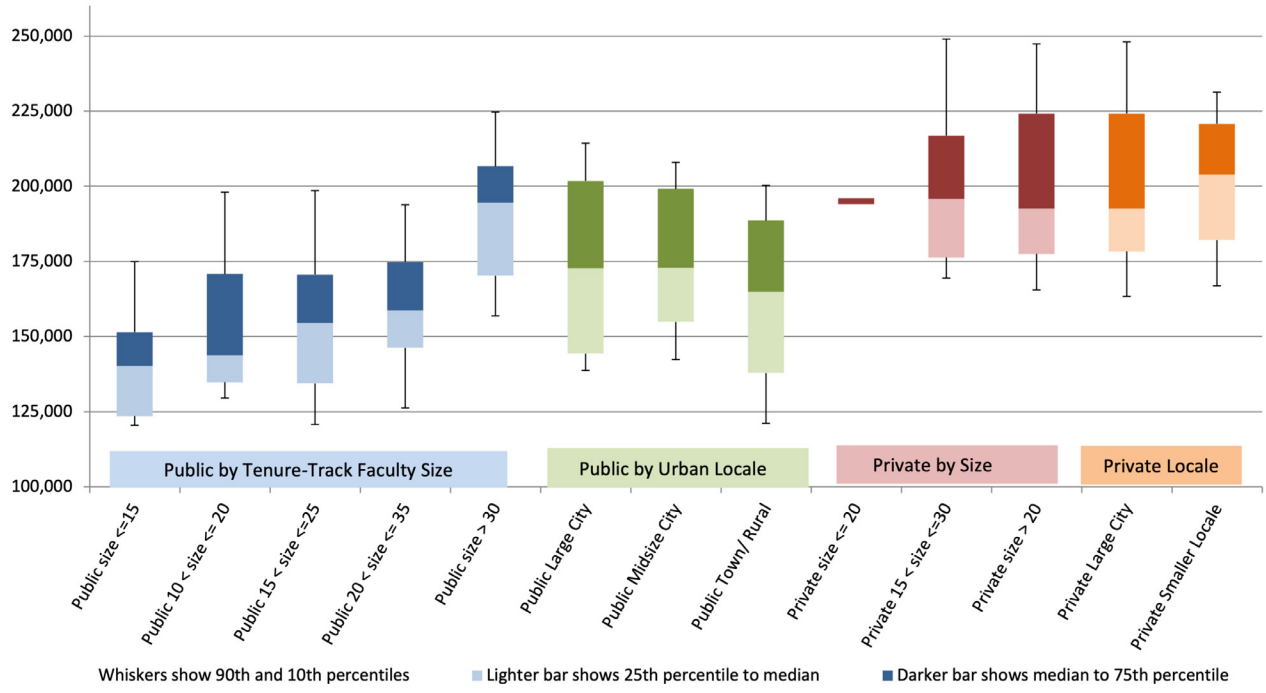


Figure S3. US CS Department Average Salary, Full Professor in Rank 0-7 Years

CRA Taulbee Survey 2021

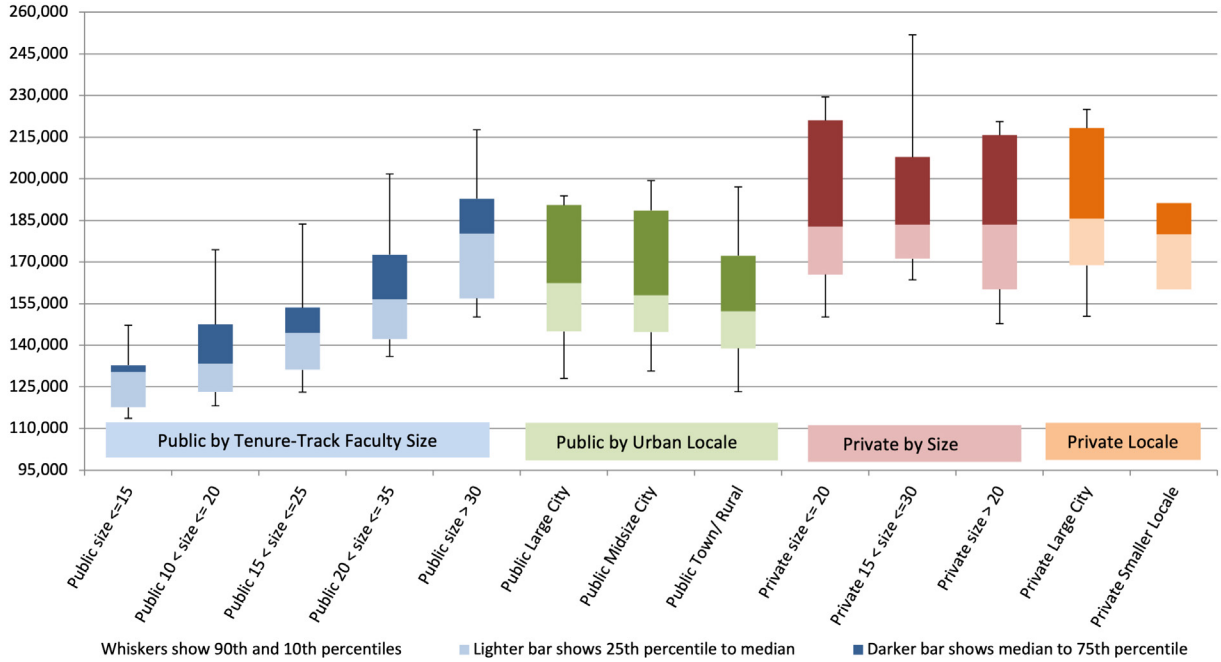


Figure S4. US CS Department Average Salary, Associate Professor in Rank 8+ Years

CRA Taulbee Survey 2021

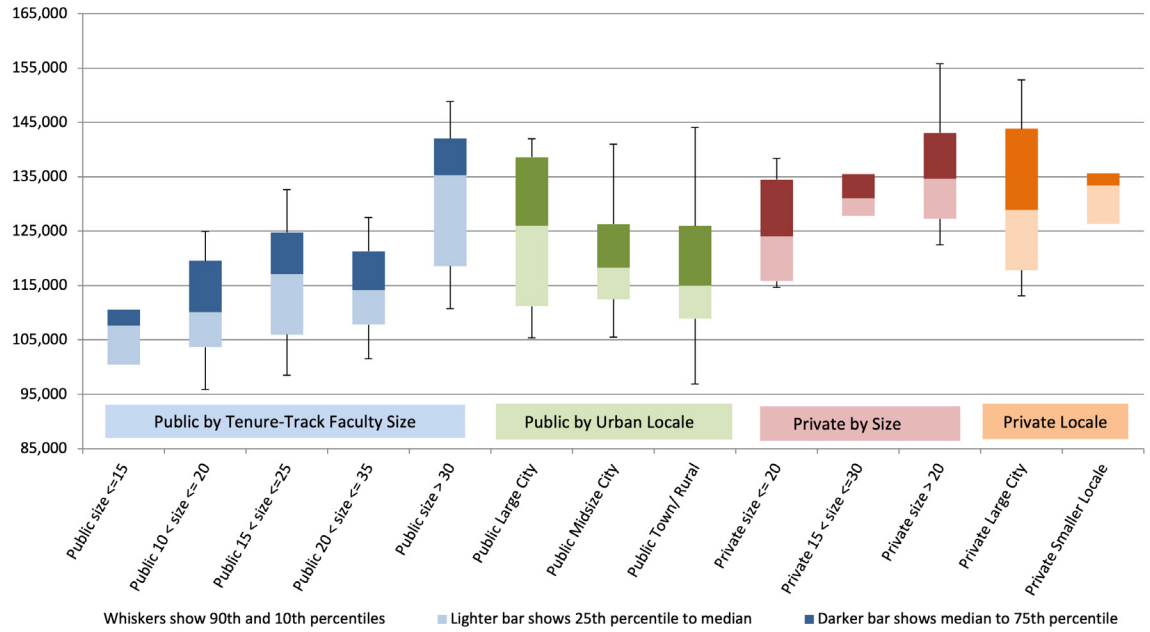


Figure S5. US CS Department Average Salary, Associate Professor in Rank 0-7 Years

CRA Taulbee Survey 2021

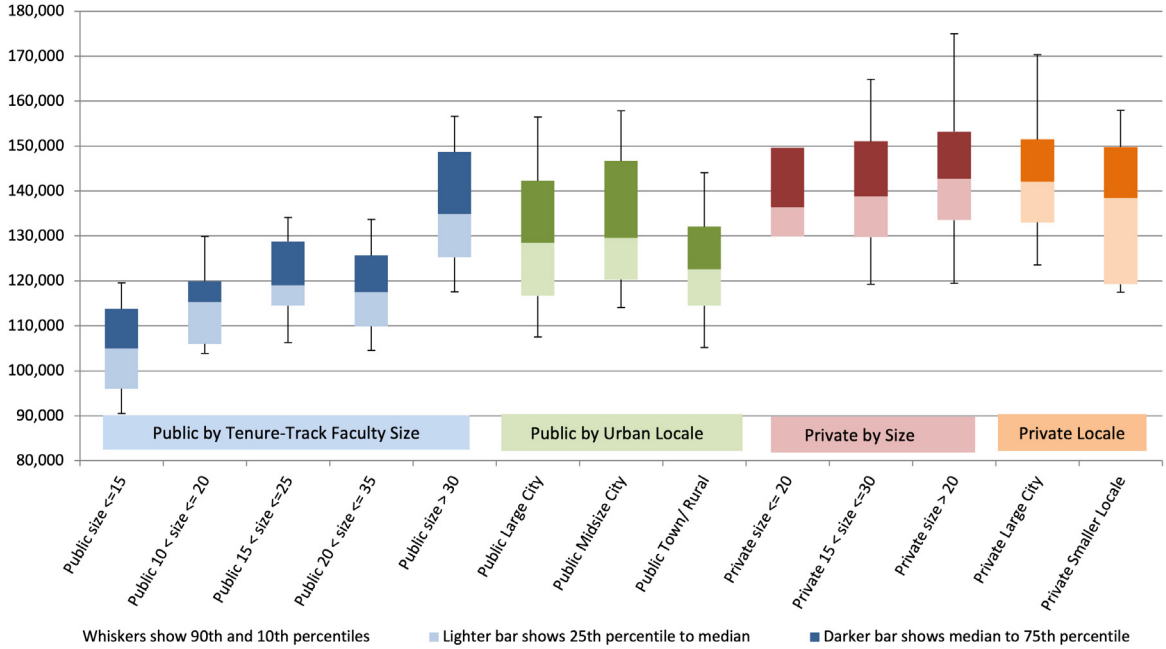


Figure S6. US CS Department Average Salary, Assistant Professor

CRA Taulbee Survey 2021

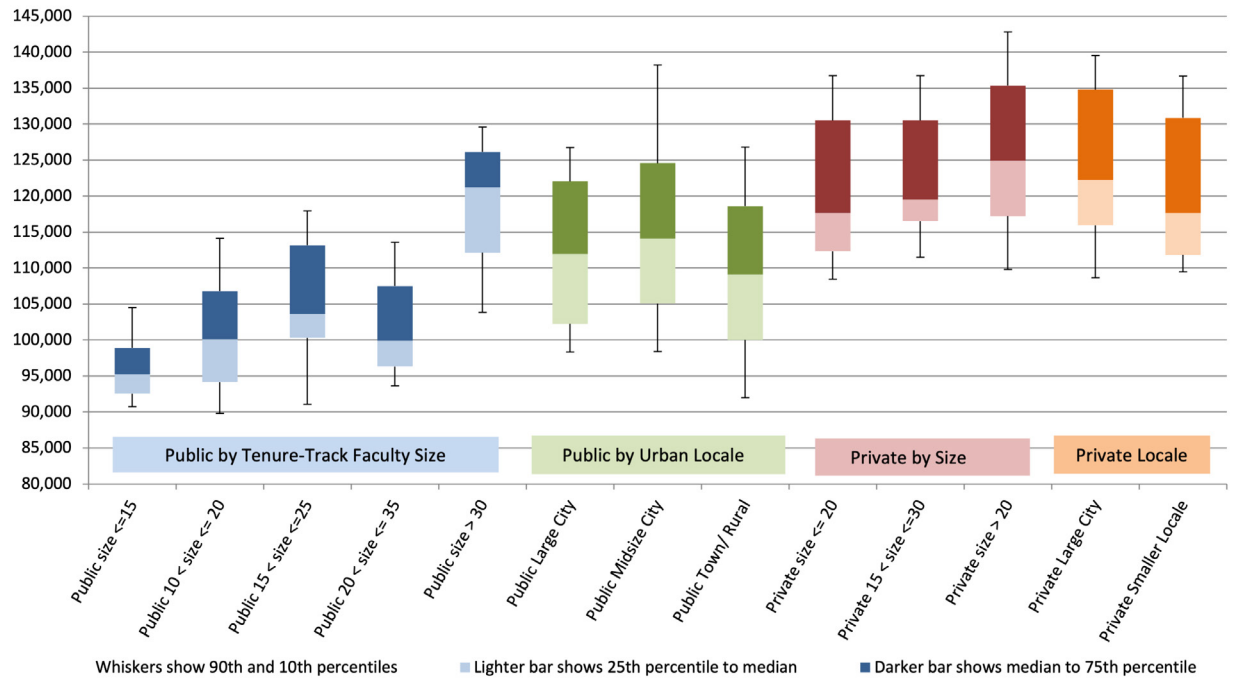


Figure S7. US CS Department Average Salary, Non-Tenure Track Teaching Faculty

CRA Taulbee Survey 2021

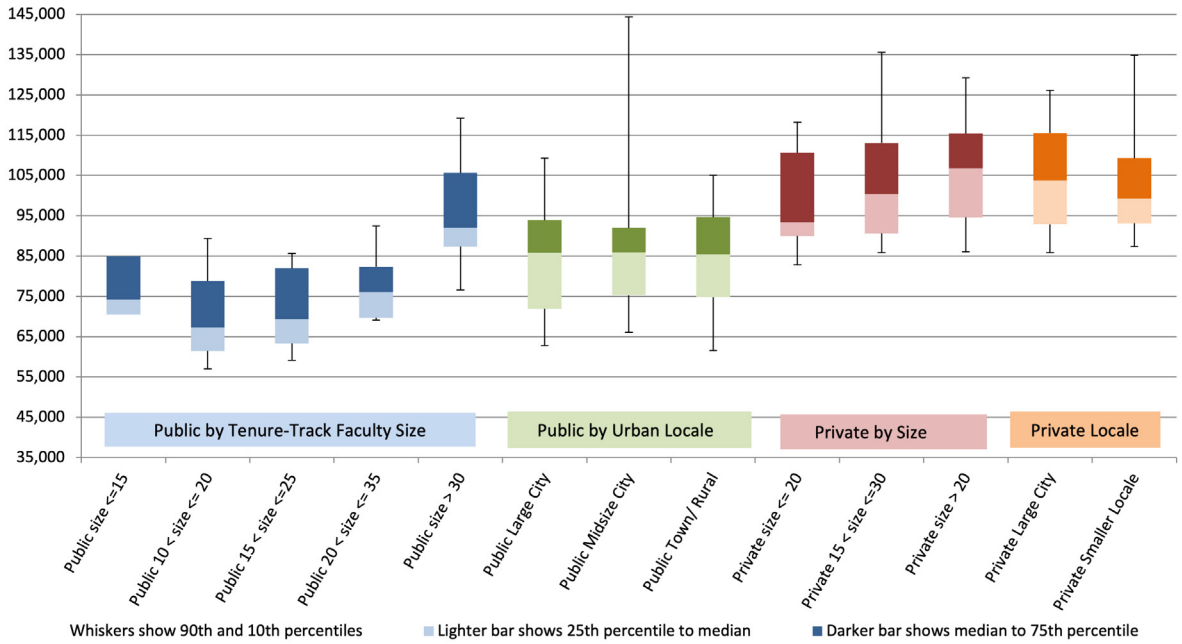


Figure S8. US CS Department Average Salary, Non-Tenure Track Research Faculty

CRA Taulbee Survey 2021

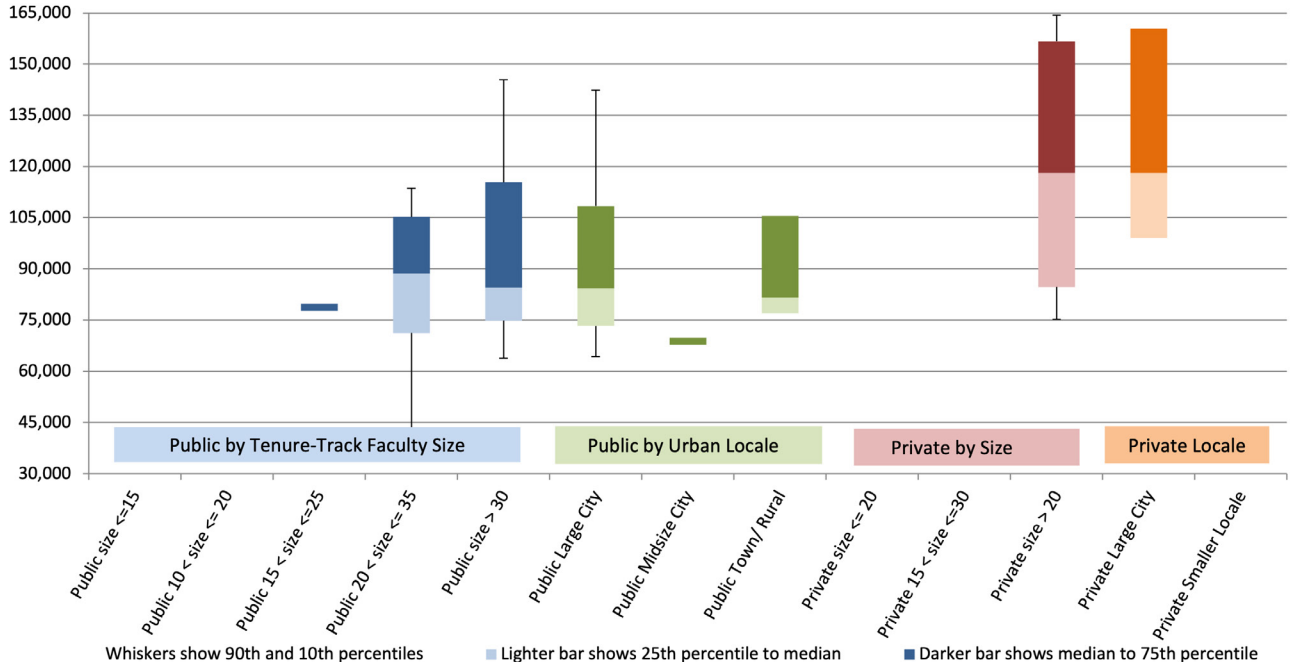
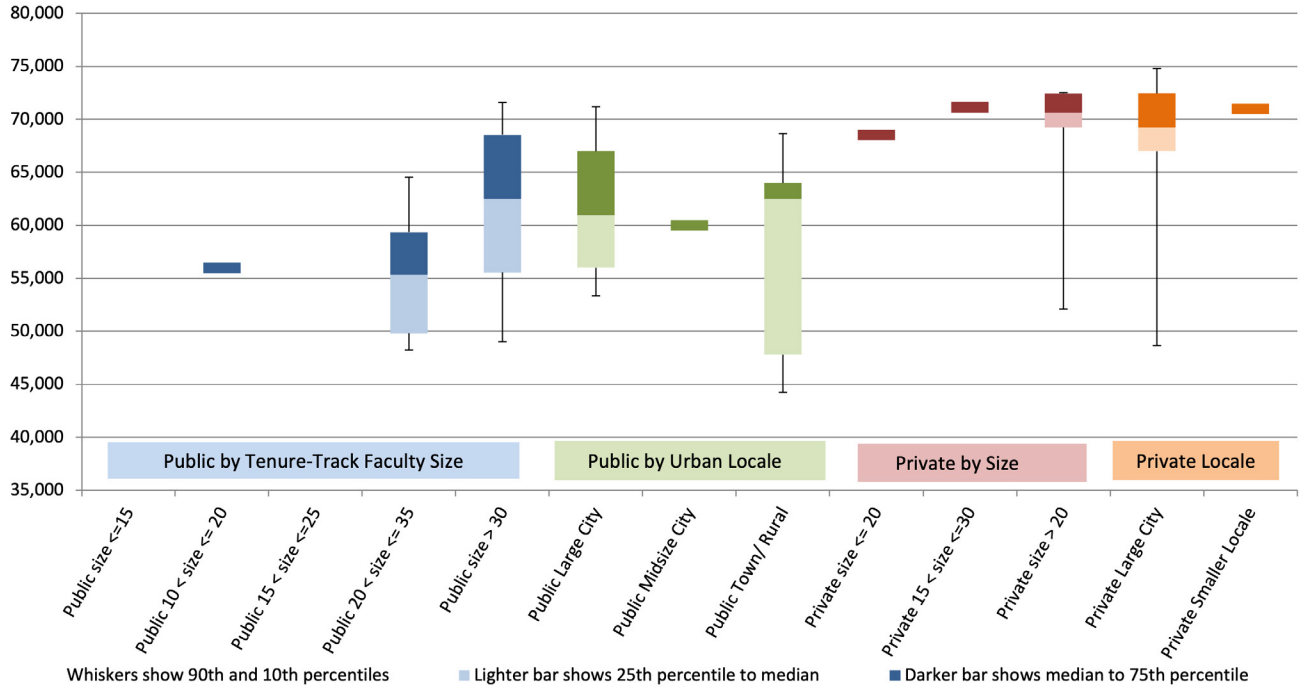


Figure S9. US CS Department Average Salary, Postdoctorates

CRA Taulbee Survey 2021



to change much from year to year. Included are data about teaching loads, sources of external funding, methods of recruiting graduate students, space, and department support staff. The most recent prior data about these activities were reported in the 2018 Taulbee Survey. The results of that survey are available on the CRA web site at https://cra.org/wp-content/uploads/2019/05/2018_Taulbee_Survey.pdf.

Faculty Startup Packages

In 2018 we began collection of certain information about startup packages for new assistant professors, so 2021 was the second time this information was collected. Among the 97 U.S. CS departments that responded to our question about the size of the startup package this year, the median of the average offered package was $285K, compared to $250K three years ago. The median among departments at public institutions was lower ($250K, compared to $240K three years ago), while the median for those at private institutions was slightly over $400K, previously $350K. Packages at I-departments had a median of $271K, previously $220K, while those at Canadian institutions had a median of $75K, previously $97.5K, in Canadian dollars. We also asked the departments if there were limits to how long this startup funding was available for use. Of the 116 total departments that responded, noticeably lower than the 140 responding in 2018, 14 percent had no set limit (previously 18 percent). The most common maximum number of years was three, but many were higher.

Teaching Loads

(Tables Prof1-Prof4)

Across all departments, the median teaching load for tenure-track faculty, as measured in semester courses per year, is 3.0. This median has not changed in a long time. The median load at public U.S. CS departments also is 3.0, that for private U.S. CS departments is 2.0, and that for U.S. I and Canadian departments is 3.5. Three years ago, the Canadian department median was 3.0, the others are unchanged from three years ago. (Table Prof1a).

Teaching loads for Teaching Professors are contained in Table Prof1b and for Other Instructors in Table Prof1c. At U.S. CS departments at public institutions, the median load is 6.0 for both categories of teaching faculty, the same as was reported three years ago. The median load in U.S. CS departments at private institutions is 4 for Teaching Professors and 5 for Other Instructors; each of these is lower than reported three years ago. U.S. I departments have a median of 5.0 for both Teaching Professors and Other Instructors; the Teaching Professors load is lower than three years ago, while the Other Instructors load is the same.

Changes from the standard teaching load are possible for all types of departments and both tenure-track and teaching faculty. Reductions in load are possible in a greater percentage of departments than are increases in load; however, load changes (in either direction) are less likely for teaching faculty than for tenure-track faculty, and tend to be less likely for Other

Table Prof1. Official Teaching Load of Tenured and Tenure-Track Faculty

	Official Teaching Load*					Academic Calendar			
Department Type	# Dept	Minimum	Mean	Median	Maximum	# Dept	Semester	Quarter	Other
US CS Public	89	1	3.1	3	9	91	81	10	0
US CS Private	27	0.7	2.7	2	8	29	25	3	1
US CE	2					2	2	0	0
US I	13	2	3.3	3.5	4	15	11	2	2
Canadian	6	2	3.3	3.5	4	6	6	0	0
Grand Total	137	0.7	3.1	3	9	143	125	15	3

* Teaching load is given for a semester calendar. Loads for a quarter system were multiplied by 2/3. To convert back to quarter-system equivalent, multiply these values by 1.5.

Table Prof1b. Official Teaching Load of Teaching Professors

	Official Teaching Load*					Academic Calendar			
Department Type	# Dept	Minimum	Mean	Median	Maximum	# Dept	Semester	Quarter	Other
US CS Public	73	2	5.4	6	12	91	81	10	0
US CS Private	23	2	4.9	4	8	29	25	3	1
US CE	2					2	2	0	0
US I	10	3	5.1	5	8	15	11	2	2
Canadian	4					6	6	0	0
Grand Total	112	2	5.3	6	12	143	125	15	3

* Teaching load is given for a semester calendar. Loads for a quarter system were multiplied by 2/3. To convert back to quarter-system equivalent, multiply these values by 1.5.

Table Prof1c. Official Teaching Load of Other Instructors

	Official Teaching Load*					Academic Calendar			
Department Type	# Dept	Minimum	Mean	Median	Maximum	# Dept	Semester	Quarter	Other
US CS Public	62	2	5.9	6	12	91	81	10	0
US CS Private	16	1	4.8	5	8	29	25	3	1
US CE	2					2	2	0	0
US I	9	1	4.8	5	8	15	11	2	2
Canadian	3					6	6	0	0
Grand Total	92	1	5.6	6	12	143	125	15	3

* Teaching load is given for a semester calendar. Loads for a quarter system were multiplied by 2/3. To convert back to quarter-system equivalent, multiply these values by 1.5.

Table Prof2. Faculty Load Reductions and Increases

	% of Respondents Where Faculty Load Reduction Possible				% of Respondents Where Faculty Load Increase Possible			
Department Type	# Dept	Tenured/ Tenure-Track	Teaching Professor	Other Instructor	# Dept	Tenured/ Tenure-Track	Teaching Professor	Other Instructor
US CS Public	90	97.8%	87.5%	46.7%	87	80.2%	53.0%	35.5%
US CS Private	28	92.9%	62.5%	28.6%	26	61.5%	19.0%	26.3%
US CE	3	100.0%	100.0%	66.7%	3	100.0%	100.0%	66.7%
US I	15	93.3%	78.6%	54.5%	14	50.0%	42.9%	33.3%
Canadian	6	100.0%	100.0%		5	80.0%	50.0%	100.0%
Grand Total	142	96.5%	82.5%	44.5%	135	73.9%	46.3%	35.1%

Table Prof3a. Types of Load Reductions Possible in Departments Offering Reductions - Tenured/Tenure Track

Department Type	# Dept	Special Package for New Faculty	Administrative Duties	Type or Size of Class Taught	Buy-out by % of salary	Buy-out by dollar amount	Strong Research Involvement	Strong Course of Curriculum Involvement	Other
US CS Public	96	81.3%	82.3%	37.5%	64.6%	16.7%	61.5%	45.8%	9.4%
US CS Private	33	66.7%	63.6%	21.2%	42.4%	9.1%	27.3%	21.2%	21.2%
US CE	3	100.0%	100.0%	66.7%	100.0%	0.0%	66.7%	33.3%	0.0%
US I	15	73.3%	86.7%	20.0%	60.0%	13.3%	33.3%	26.7%	13.3%
Canadian	7	71.4%	85.7%	28.6%	0.0%	28.6%	57.1%	42.9%	0.0%
Grand Total	154	77.3%	79.2%	32.5%	57.1%	14.9%	51.3%	38.3%	11.7%

Table Prof3b. Types of Load Reductions Possible in Departments Offering Reductions - Teaching Professors

Department Type	# Dept	Special Package for New Faculty	Administrative Duties	Type or Size of Class Taught	Buy-out by % of salary	Buy-out by dollar amount	Strong Research Involvement	Strong Course of Curriculum Involvement	Other
US CS Public	96	34.4%	58.3%	34.4%	16.7%	3.1%	19.8%	39.6%	4.2%
US CS Private	33	18.2%	33.3%	21.2%	15.2%	3.0%	9.1%	12.1%	9.1%
US CE	3	33.3%	66.7%	33.3%	0.0%	0.0%	0.0%	33.3%	0.0%
US I	15	26.7%	73.3%	13.3%	33.3%	6.7%	0.0%	26.7%	6.7%
Canadian	7	42.9%	71.4%	14.3%	0.0%	14.3%	14.3%	57.1%	0.0%
Grand Total	154	30.5%	55.2%	28.6%	16.9%	3.9%	14.9%	33.1%	5.2%

Table Prof3c. Types of Load Reductions Possible in Departments Offering Reductions - Other Instructors

Department Type	# Dept	Special Package for New Faculty	Administrative Duties	Type or Size of Class Taught	Buy-out by % of salary	Buy-out by dollar amount	Strong Research Involvement	Strong Course of Curriculum Involvement	Other
US CS Public	96	9.4%	29.2%	24.0%	7.3%	0.0%	8.3%	22.9%	5.2%
US CS Private	33	3.0%	3.0%	3.0%	3.0%	0.0%	0.0%	9.1%	3.0%
US CE	3	33.3%	66.7%	33.3%	0.0%	0.0%	0.0%	33.3%	0.0%
US I	15	20.0%	40.0%	6.7%	13.3%	0.0%	0.0%	13.3%	0.0%
Canadian	7	0.0%	14.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grand Total	154	9.1%	24.7%	16.9%	6.5%	0.0%	5.2%	18.2%	3.9%

Table Prof4a. Reasons for Increase in Teaching Load in Departments Where Increase is Possible - Tenured or Tenure-Track Faculty

Department Type	# Dept	Yes - Shifting Primary Resopnsibilities to Teaching	Yes - Other
US CS Public	69	59.4%	40.6%
US CS Private	16	62.5%	37.5%
US CE	3	66.7%	33.3%
US I	7	28.6%	71.4%
Canadian	4	50.0%	50.0%
Grand Total	99	57.6%	42.4%

Table Prof4b. Reasons for Increase in Teaching Load in Departments Where Increase is Possible - Teaching Professors

Department Type	# Dept	Yes - Shifting Primary Resopnsibilities to Teaching	Yes - Other
US CS Public	35	42.9%	57.1%
US CS Private	4	75.0%	25.0%
US CE	3	0.0%	100.0%
US I	6	33.3%	66.7%
Canadian	2	50.0%	50.0%
Grand Total	50	42.0%	58.0%

Table Prof4c. Reasons for Increase in Teaching Load in Departments Where Increase is Possible - Other Instructors

Department Type	# Dept	Yes - Shifting Primary Resopnsibilities to Teaching	Yes - Other
US CS Public	22	45.5%	54.5%
US CS Private	5	40.0%	60.0%
US CE	2	0.0%	100.0%
US I	3	66.7%	33.3%
Canadian	1	100.0%	0.0%
Grand Total	33	45.5%	54.5%

Table R2. Comparison of US CS External Funding 2003-2021.

	2003 (126 departments)		2006 (123 departments)		2009 (117 departments)		2012 (123 departments)		2015 (108 departments)		2018 (95 departments)		2021 (82 departments)	
	Total	% Fund	Total	% Fund	Total	% Fund	Total	% Fund	Total	% Fund	Total	% Fund	Total	% Fund
NSF	$354,451,309	40.7%	$255,089,816	43.0%	$281,076,341	43.1%	$368,922,448	42.2%	$342,335,280	42.93%	$347,041,991	38.26%	$357,326,367	34.9%
DARPA	$85,401,891	9.8%	$64,191,150	10.8%	$38,393,018	5.9%	$52,526,824	6.0%	$62,512,155	7.8%	$64,237,216	7.08%	$90,262,333	8.8%
NIH	$15,864,76	1.8%	$24,880,112	4.2%	$33,128,578	5.1%	$46,533,387	5.3%	$35,716,475	4.5%	$45,333,000	5.00%	$69,305,459	6.8%
DOE	$20,471,676	2.4%	$24,391,329	4.1%	$17,225,839	2.6%	$30,149,692	3.4%	$24,482,764	3.1%	$24,806,054	2.73%	$23,576,298	2.3%
State agencies	$24,438,483	2.8%	$16,875,578	2.8%	$17,861,292	2.7%	$17,725,647	2.0%	$17,648,938	2.2%	$14,326,866	1.58%	$15,177,063	1.5%
Industrial sources	$70,813,388	8.1%	$50,333,039	8.5%	$76,464,763	11.7%	$89,149,734	10.2%	$80,716,010	10.1%	$104,998,246	11.58%	$123,833,376	12.1%
Other defense	$50,555,980	20.4%	$97,512,961	16.4%	$109,510,806	16.8%	$173,606,289	19.8%	$148,555,418	18.6%	$154,468,063	17.03%	$207,881,076	20.3%
Other federal	$38,722,661	5.8%	$32,388,664	5.5%	$27,695,790	4.2%	$37,088,925	4.2%	$27,492,424	3.4%	$39,739,067	4.38%	$37,207,431	3.6%
Private foundation	$32,977,093	3.8%	$10,826,656	1.8%	$18,297,020	2.8%	$23,600,989	2.7%	$33,488,855	4.2%	$38,722,661	4.27%	$50,471,404	4.9%
IMLS							$288,059	0.0%	$79,692	0.0%	$315,218	0.03%	$174,140	0.0%
Other	$37,995,002	4.4%	$16,996,108	2.9%	$32,763,366	5.0%	$35,190,510	4.0%	$24,440,153	3.1%	$60,230,992	6.64%	$46,716,090	4.6%
Unallocated											$1,429,893	0.16%	$3,650,669	0.4%
Total	$870,327,187		$593,485,413		$652,416,813		$874,782,504		$797,468,164		$907,063,060		$1,025,466,531	
Average/ Dept	$6,907,359		$4,825,085		$5,576,212		$7,112,053		$7,383,964		$9,548,032		$12,505,689	

Table Prof5. Factors Affecting the Amount of a Graduate Student's Stipend

Department Type	# Dept	Advance to Next Stage of Program	Years of Service	GPA	Recruitment Enhancements	Different Stipend Sources	Other
US CS Public	97	51.5%	17.5%	7.2%	24.7%	36.1%	12.4%
US CS Private	33	36.4%	15.2%	0.0%	9.1%	21.2%	18.2%
US CE	3	0.0%	0.0%	0.0%	0.0%	33.3%	0.0%
US I	15	33.3%	20.0%	6.7%	6.7%	33.3%	26.7%
Canadian	7	14.3%	14.3%	14.3%	28.6%	28.6%	14.3%
Grand Total	155	43.9%	16.8%	5.8%	19.4%	32.3%	14.8%

Table Prof6. Departments Using Selected Graduate Student Recruitment Incentives

Department Type	# Dept	Upfront One-Time Signing Bonus	Stipend Enhancements	Guaranteed Multi-Year Support	Guaranteed Summer Support	Paid Visits to Campus	Other
US CS Public	97	11.3%	13.4%	46.4%	21.6%	27.8%	6.2%
US CS Private	33	12.1%	6.1%	57.6%	18.2%	57.6%	21.2%
US CE	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
US I	15	13.3%	6.7%	73.3%	13.3%	33.3%	20.0%
Canadian	7	0.0%	0.0%	28.6%	0.0%	0.0%	0.0%
Grand Total	155	11.0%	10.3%	49.7%	18.7%	32.9%	10.3%

Table Prof7. Median Amounts and Years of Selected Graduate Student Recruitment Incentives

Department Type	# Dept	Upfront One-Time Signing Bonus	Stipend Enhancements	Guaranteed Multi-Year Support	Guaranteed Summer Support	Paid Visits to Campus
US CS Public	54	3,000.00	6,250.00	4	6,425.00	700
US CS Private	21			5	6,826.00	600
US CE	0					
US I	9			4.5		
Total US	84	4,000.00	6,250.00	4.5	6,570.00	700
Canadian	1					

Instructors than for Teaching Professors (Table Prof2). Tables Prof3a, b, and c provide, for tenure-track, Teaching Professor, and Other Instructor faculty respectively, statistics on the percentage of departments that afford teaching load reductions for different types of activities. Tables Prof4a, b, and c give statistics about possible increases in the teaching load above the standard level.

Sources of External Funding

(Table R2)

Table R2 shows an abbreviated history of the sources of CS research funding, as reported every three years since 2015. Fewer departments provided this data in 2018, but the distribution is similar to previous years. NSF is by far the biggest funder of CS research, though its share of the total has fallen from 42.9 percent in 2015 to 34.9 percent in 2021. The share of CS funding from DOE and state agencies also has fallen during each of these 3-year periods, while industry funding and funding from NIH increased in percentage. This year, funding from other defense agencies, the second largest funding source, increased its share to just over 20 percent.

During each of the three-year periods, there was roughly a 13 percent increase in total funding and a 30 percent increase in the average funding per department. These roughly translate into compounded 4 and 9 percent annual increases, respectively.

Other Graduate Student Data

(Tables Prof5-Prof7)

Table Prof5 indicates the factors that affect the amount of the stipend of graduate students. In aggregate across all types of departments, advancement to the next stage of the graduate program is again the most likely factor, with stipend source next most likely. This is similar to previous reports., though stipend

Table Prof8. Department Space, net square feet, All US (109 Departments)

Percentiles	Total Space	Faculty, Staff, and Student Offices	Conference and Seminar Rooms	Research Labs	Instructional Labs
10	15,000	6,278	784	1,339	882
25	20,500	8,088	1,500	3,460	2,000
50	35,856	12,303	2,829	7,899	3,754
75	63,064	31,606	5,139	14,949	8,193
90	114,947	49,153	9,539	21,578	15,000

Table Prof9. Department Space, net square feet, US CS Public (72 Departments)

Percentiles	Total Space	Faculty, Staff, and Student Offices	Conference and Seminar Rooms	Research Labs	Instructional Labs
10	14,748	5,769	596	2,820	1,639
25	20,393	7,616	1,200	5,938	2,673
50	36,148	11,108	2,259	10,000	5,293
75	71,643	30,704	5,000	17,580	10,616
90	133,123	51,777	9,665	22,477	15,000

source is a factor in a higher percentage of institutions this year than it was three years ago.

Table Prof6 indicates the types of incentives provided when recruiting graduate students. Compared with three years ago, a somewhat higher percentage of U.S. CS public and U.S. I departments report offering guaranteed multi-year support and guaranteed summer support, while a lower percentage report offering paid campus visits, stipend enhancements and upfront signing bonuses. At U.S. CS private departments, however, a higher percentage offer upfront signing bonuses and guaranteed multi-year support and a lower percentage report offering stipend enhancements and guaranteed summer support, with a similar percentage offering paid campus visits. Table Prof7 shows the median amounts reported for those that offered various recruiting incentives, for those situations for which a sufficient number of departments provided data. The amount of signing bonuses was higher than that reported three years ago, while the amount of stipend enhancements was slightly higher, and the amount summer support was lower.

Space

(Tables Prof8-Prof22)

Median total space at U.S. departments increased 8.8 percent over that reported three years ago. All categories of space increased, with conference and seminar rooms leading the way with a 24.6 percent increase, and instructional labs increasing by

Table Prof10. Department Space, net square feet, US CS Private (23 Departments)

Percentiles	Total Space	Faculty, Staff, and Student Offices	Conference and Seminar Rooms	Research Labs	Instructional Labs
10	18,535	8,796	865	1,917	0
25	20,903	10,752	2,087	2,664	889
50	33,601	22,268	3,439	4,046	2,052
75	56,650	32,333	5,020	9,359	3,677
90	69,269	44,081	9,454	18,626	7,647

Table Prof11. Department Space, net square feet, US CE (1 Departments)

Percentiles	Total Space	Faculty, Staff, and Student Offices	Conference and Seminar Rooms	Research Labs	Instructional Labs
10					
25					
50					
75					
90					

Table Prof12. Department Space, net square feet, US Information (13 Departments)

Percentiles	Total Space	Faculty, Staff, and Student Offices	Conference and Seminar Rooms	Research Labs	Instructional Labs
10	16,075	6,887	1,815	491	863
25	20,519	10,000	2,150	2,000	1,697
50	38,147	23,754	3,698	4,052	3,500
75	62,346	30,460	5,488	4,871	4,947
90	105,980	33,310	8,202	15,658	9,022

Table Prof13. Department Space, net square meters, Canadian (7 Departments)

Percentiles	Total Space	Faculty, Staff, and Student Offices	Conference and Seminar Rooms	Research Labs	Instructional Labs
10					
25					
50	6,039	1,919	354	1,412	1,139
75					
90					

Table Prof14. Definite Plans to Gain or Lose

Department Type	# Dept	Gain Space	No Change	Lose Space
US CS Public	89	33%	65%	2%
US CS Private	27	37%	63%	0%
US CE	3	33%	67%	0%
US I	15	27%	60%	13%
Canadian	6	17%	83%	0%
Grand Total	140	32%	65%	3%

Table Prof15. Sources of Funding for Additional Space

Department Type	# Dept	% Departments Adding Space Using Funds from Source				
		Institutional	Federal	State / Provincial	Industry	Private
US CS Public	96	20.8%	3.1%	14.6%	4.2%	11.5%
US CS Private	33	27.3%	0.0%	0.0%	0.0%	6.1%
US CE	3	66.7%	0.0%	0.0%	0.0%	0.0%
US I	15	20.0%	0.0%	0.0%	0.0%	6.7%
Canadian	7	28.6%	14.3%	0.0%	14.3%	14.3%
Grand Total	154	23.4%	2.6%	9.1%	3.2%	9.7%

Table Prof16. Department Space, net square feet per faculty member (tenured and tenure-track, or tenured and tenure-track plus research), All US Public CS (108 Departments)

Percentiles	Total Space		Faculty, Staff, and Student Offices		Conference and Seminar Rooms		Research Labs		Instructional Labs	
	Ten-Track	Tot-Fac	Ten-Track	Tot-Fac	Ten-Track	Tot-Fac	Ten-Track	TT+Rsrch	Ten-Track	TT+Teach
10	736	631	215	205	21	20	35	32	0	0
25	904	820	316	306	52	48	116	97	50	36
50	1,216	1,088	462	412	88	77	245	238	111	86
75	1,714	1,468	764	648	141	121	387	365	221	170
90	2,612	2,404	1,025	927	213	171	559	506	372	272

Table Prof17. Department Space, net square feet per faculty member (tenured and tenure-track, or tenured and tenure-track plus research), US Public CS (71 Departments)

Percentiles	Total Space		Faculty, Staff, and Student Offices		Conference and Seminar Rooms		Research Labs		Instructional Labs	
	Ten-Track	Tot-Fac	Ten-Track	Tot-Fac	Ten-Track	Tot-Fac	Ten-Track	TT+Rsrch	Ten-Track	TT+Teach
10	747	719	213	209	24	23	61	61	28	15
25	929	904	308	306	51	48	183	171	94	70
50	1,240	1,152	430	392	81	75	339	314	156	109
75	1,681	1,554	697	589	130	113	426	385	289	197
90	2,569	2,353	943	862	192	168	577	543	400	276

Table Prof18. Department Space, net square feet per faculty member (tenured and tenure-track, or tenured and tenure-track plus research), US Private CS (23 Departments)

Percentiles	Total Space		Faculty, Staff, and Student Offices		Conference and Seminar Rooms		Research Labs		Instructional Labs	
	Ten-Track	Tot-Fac	Ten-Track	Tot-Fac	Ten-Track	Tot-Fac	Ten-Track	TT+Rsrch	Ten-Track	TT+Teach
10	675	489	264	204	3	2	68	37	0	0
25	758	627	371	332	42	40	79	62	0	0
50	943	745	469	469	100	75	140	110	66	42
75	1,825	1,332	1,002	618	154	107	221	199	88	69
90	2,362	1,564	1,494	1,020	261	147	307	275	154	121

Table Prof19. Department Space, net square feet per faculty member (tenured and tenure-track, or tenured and tenure-track plus research), US CE (1 Departments)

Percentiles	Total Space		Faculty, Staff, and Student Offices		Conference and Seminar Rooms		Research Labs		Instructional Labs	
	Ten-Track	Tot-Fac	Ten-Track	Tot-Fac	Ten-Track	Tot-Fac	Ten-Track	TT+Rsrch	Ten-Track	TT+Teach
10										
25										
50										
75										
90										

Table Prof20. Department Space, net square feet per faculty member (tenured and tenure-track, or tenured and tenure-track plus research), US Information (13 Departments)

Percentiles	Total Space		Faculty, Staff, and Student Offices		Conference and Seminar Rooms		Research Labs		Instructional Labs	
	Ten-Track	Tot-Fac	Ten-Track	Tot-Fac	Ten-Track	Tot-Fac	Ten-Track	TT+Rsrch	Ten-Track	TT+Teach
10	849	737	292	221	70	49	27	21	0	0
25	990	821	321	321	85	74	102	95	18	14
50	1,272	1,272	679	625	104	103	121	107	75	48
75	1,675	1,450	765	741	186	148	196	195	163	88
90	2,401	2,355	844	758	275	244	354	350	225	173

Table Prof21. Department Space, net square meters per faculty member (tenured and tenure-track, or tenured and tenure-track plus research), Canadian (7 Departments)

Percentiles	Total Space		Faculty, Staff, and Student Offices		Conference and Seminar Rooms		Research Labs		Instructional Labs	
	Ten-Track	Tot-Fac	Ten-Track	Tot-Fac	Ten-Track	Tot-Fac	Ten-Track	TT+Rsrch	Ten-Track	TT+Teach
10										
25										
50	131	131	40	37	7	7	37	37	20	14
75										
90										

Table Prof22. Department Space, All US (109 Departments)

Percentiles	Percent of Total Space Allocated To			
	Faculty, Staff, and Student Offices	Conference and Seminar Rooms	Research Labs	Instructional Labs
10	21	2	3	0
25	30	4	7	3
50	39	7	22	10
75	53	10	33	17
90	63	16	43	26

13.3 percent. Median research lab and faculty/staff/student office space had 5.6 and 3.6 percent increases, respectively (Table Prof8). Reductions in the number of departments reporting may make this comparison an unreliable indicator of what happened at comparable departments. This year, there were 16 fewer U.S. CS departments at public institutions and 5 fewer at private institutions reporting their space totals. Nevertheless, Tables Prof9-13 report the results from those institutions that reported this year, based on department type. There were too few CE departments reporting to reveal any of this category's data.

A smaller percentage of departments report definite plans to gain space in the near future than was the case three years ago (32 vs 41 percent). Only CE and U.S. CS public institutions reported similar percentages compared with three years ago (Table Prof14). Institutional funds, as usual, is the most likely source of funding for this increased space, though at U.S. CS public departments, state funding was a closer second than it was three years ago (Table Prof15).

Tables Prof16-Prof21 show in turn for the various department types, the distribution of space of each type, normalized for faculty size. Once again, there were too few CE departments reporting to display any values for that type of department. Table Prof22 shows the distribution of percentage of space (as opposed to amount of space as reported above) among the various space categories at U.S. departments. Thus, for example, half of the departments allocate 39 percent or more of their space to offices, and half allocate 39 percent or less space for offices. The median values (i.e., the entries in the 50th percentile row) are very close to the values reported three years ago.

Departmental Support Staff

(Tables Prof23-Prof28)

Tables Prof23-Prof28 show the distribution of department staff for the different department types. Across all institutions (Table Prof23), there was little change in the median values of any of the categories of staff. U.S. CS departments at private universities showed an increase in median staffing for computer support on external funds and for research staff on institutional funds, while U.S. CS departments at public universities did not show any real change from the median levels of three years ago. U.S. I departments, which mainly are I-schools, had much larger median staffing than did U.S. CS departments, but had an increase in the median administrative staff size from 27.5 to 19.8 over the past three years. This year's level is comparable to that of six years ago. There are two more such I departments reporting this year, and since the

Table Prof23. Full Time Staff by Type of Support – All Institutions

Percentiles	Secretarial / Administrative			Computer Support			Research		
	Institutional	External Support	Total	Institutional	External Support	Total	Institutional	External Support	Total
10	2	0	3	1	0	1	0	0	0
25	3.5	0	4	1	0	1	0	0	0
50	7	1	8	3	0	3	0.1	2	2
75	13	2.8	14	5.7	2	6	2	5.7	5.8
90	37.8	5	37.8	8	4.8	9.3	7	15	16.4
# Dept	137	47	137	116	43	118	64	60	86

Table Prof24. Full Time Staff by Type of Support – US CS Public

Percentiles	Secretarial / Administrative			Computer Support			Research		
	Institutional	External Support	Total	Institutional	External Support	Total	Institutional	External Support	Total
10	2	0	2	0.7	0	1	0	0	0
25	3	0	3	1	0	1	0	0	0
50	5	0.8	5.5	2	0	2	0	1	1
75	11.8	1.8	12	4	2	4.5	1	3.5	3
90	30.4	5.2	31.8	8	4	8	3.7	13.8	15.1
# Dept	86	30	86	74	29	75	39	35	50

Table Prof25. Full Time Staff by Type of Support – US CS Private

Percentiles	Secretarial / Administrative			Computer Support			Research		
	Institutional	External Support	Total	Institutional	External Support	Total	Institutional	External Support	Total
10	3	0	3.6	0		1	0	0	1.6
25	5	0.1	5	1		1	0.6	1.9	3
50	8.3	1.8	8.3	3.5	2	4	3	3	4
75	12	3.5	13	6		6	8.5	11.3	13
90	35.9	5	37.9	8		9	35.5	20	32.5
# Dept	27	11	27	21	6	21	11	16	19

Table Prof26. Full Time Staff by Type of Support – US CE

Percentiles	Secretarial / Administrative			Computer Support			Research		
	Institutional	External Support	Total	Institutional	External Support	Total	Institutional	External Support	Total
10									
25									
50									
75									
90									
# Dept	3	0	3	3	0	3	2	1	3

Table Prof27. Full Time Staff by Type of Support – US Information

Percentiles	Secretarial / Administrative			Computer Support			Research		
	Institutional	External Support	Total	Institutional	External Support	Total	Institutional	External Support	Total
10	6.3		6.3	2.5		3.6	0		0
25	7.8		7.8	4		4	0.2		1
50	19.8		19.8	5	1	5.8	1.5	1.5	2
75	31.8		31.8	6		6.3	2		4
90	49.6		53	8		7.9	4.3		6.5
# Dept	14	4	14	11	5	12	10	6	11

Table Prof28. Full Time Staff by Type of Support – Canadian

Percentiles	Secretarial / Administrative			Computer Support			Research		
	Institutional	External Support	Total	Institutional	External Support	Total	Institutional	External Support	Total
10									
25									
50	12		12	6		6			
75									
90									
# Dept	7	2	7	7	3	7	2	2	3

total number of such departments is 14 this year, these two departments can have a larger influence on medians than likely would be the case for CS departments.

Disability and Socioeconomic Data

(Table Prof29)

For the first time this year we attempted to obtain information about students with disabilities. We asked departments to report the number of students at each degree level who have received accommodations for disabilities during the past academic year. At the request of CRA's Center for Evaluating the Research Pipeline, we also asked departments to report how many of their undergraduate majors receive Pell grants, and how many are first generation college students. From a preliminary feasibility survey, we had reason to believe that such Information could be provided by many departments. We obtained data from about 1/3 to 1/2 of the departments, and the results are in Table Prof29.

The table indicates that many departments reported no graduate students receiving disability accommodations and the average reporting department has between 1 and 2 doctoral students and between 3 and 4 master's students receiving accommodations. This represents less than 1 percent of total graduate students at each level, and only one percent of the graduate students in the departments that provided data about accommodations (one percent of PhD students and 0.8 percent of masters students). At the undergraduate level, 4.1 percent of the undergraduate majors receive disability accommodations at those departments that provided data about accommodations.

More than 10 percent of all enrolled undergraduates are known to be receiving Pell grants, and a similar percentage are first generation college students. When normalized for the number of students in the departments that provided data about Pell grants and first generation status, the percentages were 21.7 and 19.3, respectively. If the US programs are separated by public and private status, 23.8 percent of computing undergraduates at public institutions receive Pell grants, compared to 12.3%

Table Prof29. Students With Disability Accommodations, Pell Grants, and First Generation Status

	Number of Depts	Total Enrollment	Total With Accommodations	Percent of Enrollment With Accommodations	Percent of Depts Reporting Zero Accommodation	Max Dept Percent of Accommodations	Average Number of Students With Accommodations
PhD	78	9,889	99	1.0%	62%	6%	1.4
Masters	57	20,399	164	0.8%	58%	10%	3.4
Bachelors	51	69,387	2,858	4.1%	35%	17%	62.9
	Number of Depts	**Total Enrollment**	**Total With That Status**	**Percent of Enrollment With Status**			
Pell Grant	66	92,706	20,146	21.7%	[Overall per NCES 33.6%]		
First Generation	72	99,446	19,160	19.3%			
		% Pell from Taulbee		**% Pell NCES, Dependent Student***	**%Pell NCES, Independent Student***		
Pell Grant, US Public	53	23.8%		40.5%	22.0%		
Pell Grant, US Private	12	12.3%		14.1%	11.8%		

* Source of NCES Pell Data, Federal Pell Grant Program of the Higher Education Act: Primer, Congressional Research Service, Updated Sept. 9, 2021

at private institutions. The National Center for Educational Statistics (NCES) numbers on Pell grants show 33.6% of undergraduates receiving a grant, and a higher proportion of recipients at public institutions than at private.

Concluding Observations

The 2020-21 academic year was the first full academic year under the COVID pandemic. Therefore, we were particularly interested in observing how data from this year compared with pre-COVID data. Data reported from the 2021-22 academic year (such as for new student enrollment and salary data) is from the second full academic year under the pandemic, and we were interested in seeing any possible delayed effects due to the pandemic, or any recovery from the first pandemic year.

The decline this year in the response rate from U.S. CS departments makes it necessary to be careful in drawing conclusions, so that year-to-year comparisons from departments reporting both years is helpful. We reported such comparisons with respect to overall doctoral degree production and enrollment, and overall bachelor's degree production and enrollment. In all of these instances, we observed Increases in 2020-21 from their 2019-20 levels. On the other hand, enrollment of new doctoral students and new bachelor's students both declined in 2021-22 from their 2020-21 levels.

Master's student data, faculty data, and gender and ethnicity data for doctoral and bachelor's students is not reported for departments reporting both years. However, we are pleased to see overall increases in CS gender diversity at all degree levels with respect to both degree production and enrollment. New faculty hires also exhibited an Increase in gender diversity. With respect to race/ethnicity, there were somewhat mixed results. At the doctoral level, there was an Increase in diversity among degree recipients, but a decrease in diversity in enrollment. At the bachelor's level, there was also a slight increase in diversity among degree recipients and a slight decline in enrollment diversity. Little change was observed at the master's level, and new faculty hires showed a slight decline.

Of note was the 2021-22 recovery in the fraction of new U.S. CS department graduate students from outside of North America from Its large drop in 2020-21. These recoveries took place at both the master's and doctoral levels.

Overall, it appears that there has been little net impact to date on the overall student profile as a result of the pandemic.

The CRA survey of department chairs in summer 2020 suggested some concern about the impact of the pandemic on junior faculty. This year's survey therefore included questions about extensions of the tenure clock, extensions of time to spend startup funds, and other activities intended to mitigate this impact.

Of the 116 departments responding to the tenure clock question, 90% said that the clock had been or could be extended. Most extensions were for one year, some were for two. Some were on-request or case-by-case; others were an automatic extension with the ability to opt out.

Of the 96 departments answering the startup funds question, 62% said that this clock had been extended, or that it could be on request. Some said that the use was tied to pre-tenure status and therefore extensions were not needed if the tenure clock was extended.

Participating CS, CE, I and Canadian Departments

(Departments marked with * have participated in all 5 of the most recent Taulbee surveys)

U.S. CS Public (105):

Arizona State*, Auburn*, Augusta University, Binghamton, Boise State, Clemson*, College of William & Mary*, Colorado School of Mines*, Colorado State*, Florida International*, George Mason*, Georgia Tech*, Georgia State*, Indiana University Purdue University Indianapolis, Indiana*, Iowa State*, Kansas State*, Kent State*, Michigan State*, Michigan Technological University*, Mississippi State, Missouri University of Science and Technology*, Montana State*, Naval Postgraduate School*, New Jersey Institute of Technology*, New Mexico State, North Carolina State*, North Dakota State*, Ohio State*, Oklahoma State*, Old Dominion, Oregon State*, Pennsylvania State*, Portland State*, Purdue*, Rutgers*, Stony Brook (SUNY)*, Tennessee Tech, Texas A&M*, Texas State, Texas Tech*, University at Buffalo*, Universities of: Alabama (Tuscaloosa), Arizona*, Arkansas*, Arkansas at Little Rock*, California (Berkeley*, Davis*, Irvine*,

Los Angeles*, Merced, Riverside*, San Diego*, Santa Barbara*, and Santa Cruz*), Colorado (Boulder)*, Connecticut*, Delaware*, Florida*, Houston*, Idaho*, Illinois (Chicago* and Urbana-Champaign*), Iowa*, Kentucky, Louisiana at Lafayette*, Maryland (College Park* and Baltimore County*), Massachusetts (Amherst*), Memphis*, Michigan, Minnesota*, Missouri (Columbia), Nebraska (Omaha and Lincoln*), Nevada (Las Vegas*), New Hampshire*, New Mexico*, North Carolina (Chapel Hill* and Charlotte*), North Texas*, Oklahoma*, Oregon*, Pittsburgh*, Rhode Island*, South Carolina*, South Florida*, Southern Mississippi, Tennessee (Knoxville)*, Texas (Arlington*, Austin*, Dallas*, El Paso*, and San Antonio), Utah*, Vermont*, Virginia*, Washington*, Washington Human-Centered Design & Engr, Wisconsin (Madison* and Milwaukee), Utah State, Virginia Tech*, Washington State*, Western Michigan, and Wright State*.

U.S. CS Private (38):

Boston University*, Brandeis*, Brown*, Carnegie Mellon*, Case Western Reserve*, Columbia, Cornell*, DePaul*, Drexel*, Duke*, Emory*, Florida Institute of Technology, George Washington, Harvard*, Johns Hopkins*, Lehigh*, MIT*, New York University*, Northeastern*, Northwestern*, NYU Tandon School*, Pace, Princeton*, Rensselaer*, Rice*, Rochester Institute of Technology*, Stanford*, Stevens Institute of Technology*, Toyota Technological Institute at Chicago*, Tufts*, Tulane, Universities of: Chicago*, Notre Dame*, Pennsylvania*, and Rochester*, Washington in St. Louis*, Worcester Polytechnic Institute*, and Yale.

U.S. CE (6):

Carnegie Mellon, Case Western Reserve, Universities of: Central Florida* and Illinois (Chicago and Urbana-Champaign*), and New Mexico.

U.S. Information (16):

Cornell*, Drexel*, Indiana*, Penn State*, Syracuse*, Universities of: Arizona, California (Berkeley)*, Cincinnati, Colorado (Boulder)*, Illinois (Urbana-Champaign)*, Maryland (College Park ISchool* and Baltimore County*), Michigan*, North Carolina (Chapel Hill)*, Pittsburgh*, and Washington*.

Canadian (8):

Concordia, Simon Fraser*, Universities of: British Columbia, Manitoba*, New Brunswick, Toronto*, Victoria, and Waterloo*,

[1] The title of the survey honors Orrin E. Taulbee of the University of Pittsburgh, who conducted these surveys for the Computer Science Board until 1984, with retrospective annual data going back to 1970.

[2] Information (I) programs included here are Information Science, Information Systems, Information Technology, Informatics, and related disciplines with a strong computing component. Surveys were sent to CRA members, the CRA Deans group members, and participants in the iSchools Caucus (www.ischools.org) who met the criteria of granting Ph.D.s and being located in North America. Other I programs who meet these criteria and would like to participate in the survey in future years are invited to contact survey@cra.org for inclusion.

[3] Classification of the population of an institution's locale is in accordance with the Carnegie Classification database. Large cities are those with population >= 250,000. Mid-size cities have population between 100,000 and 250,000. Town/rural populations are less than 100,000.

[4] All faculty tables: The survey makes no distinction between faculty specializing in CS vs. CE programs. Every effort is made to minimize the inclusion of faculty in electrical engineering who are not computer engineers.