COMPUTING RESEARCH NEWS

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# CRN At-A-Glance

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

This article and the accompanying figures and tables present the results from the 51st annual CRA Taulbee Survey, which 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, computer engineering, or information.

*see page 2 for full article*

## CRA-E REU Support Program Survey

The CRA Education Committee (CRA-E) requests a few minutes of your time to answer a short survey. The goal of the survey is to gain insight into faculty interest in a potential virtual program focused on mentoring undergraduate CISE researchers. The virtual program will educate undergraduate student researchers about research methods, graduate school, and research careers and connect participants with a network of undergraduate research peers. Students will be engaged in discussions with a research community of their peers, drawn from a broad range of institutions.

If you mentor or plan to mentor undergraduate researchers, please complete this brief survey (2 required questions). For your feedback to have maximum impact, please complete the survey by June 10.

*see page 83 for full article*

## In This Issue

# 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**

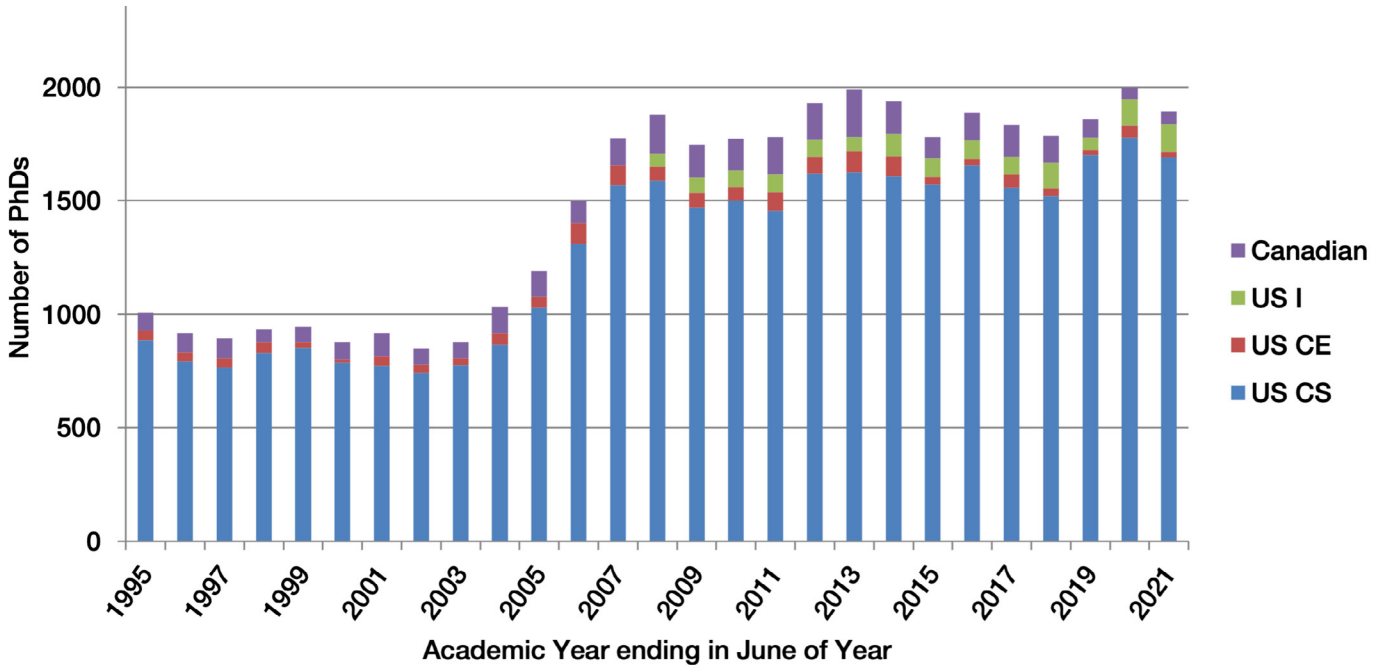



**Figure D2. Nonresident Aliens as Fraction of PhD Enrollments**

**CRA Taulbee Survey 2021**

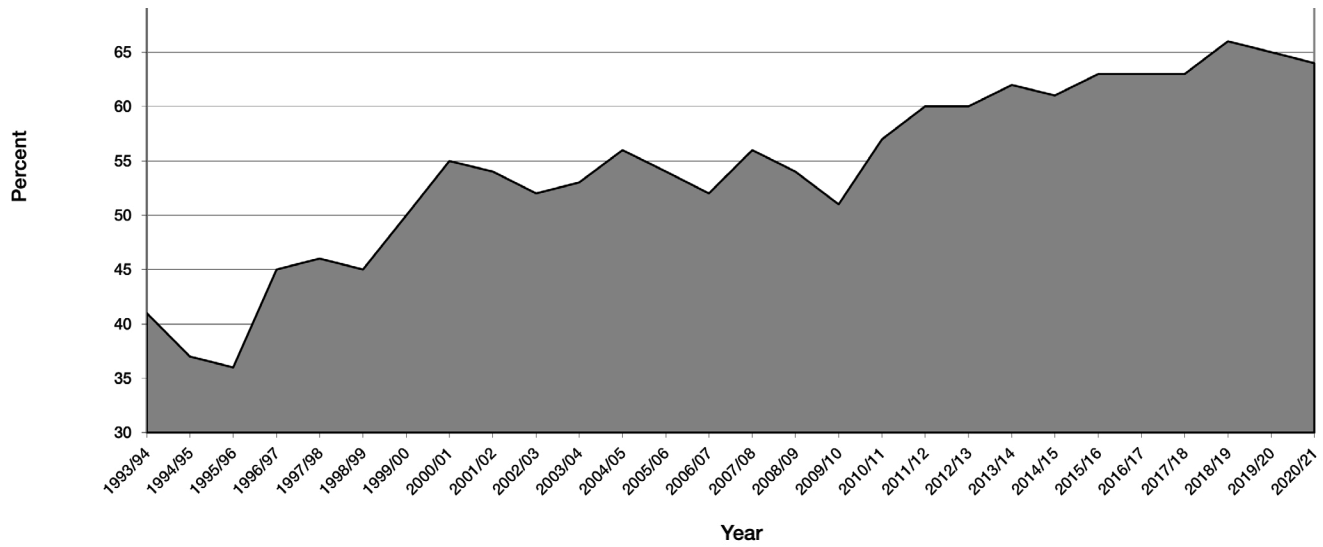


**Figure D3. PhD Degrees Granted by Tenure-Track Size**

**CRA Taulbee Survey 2021**

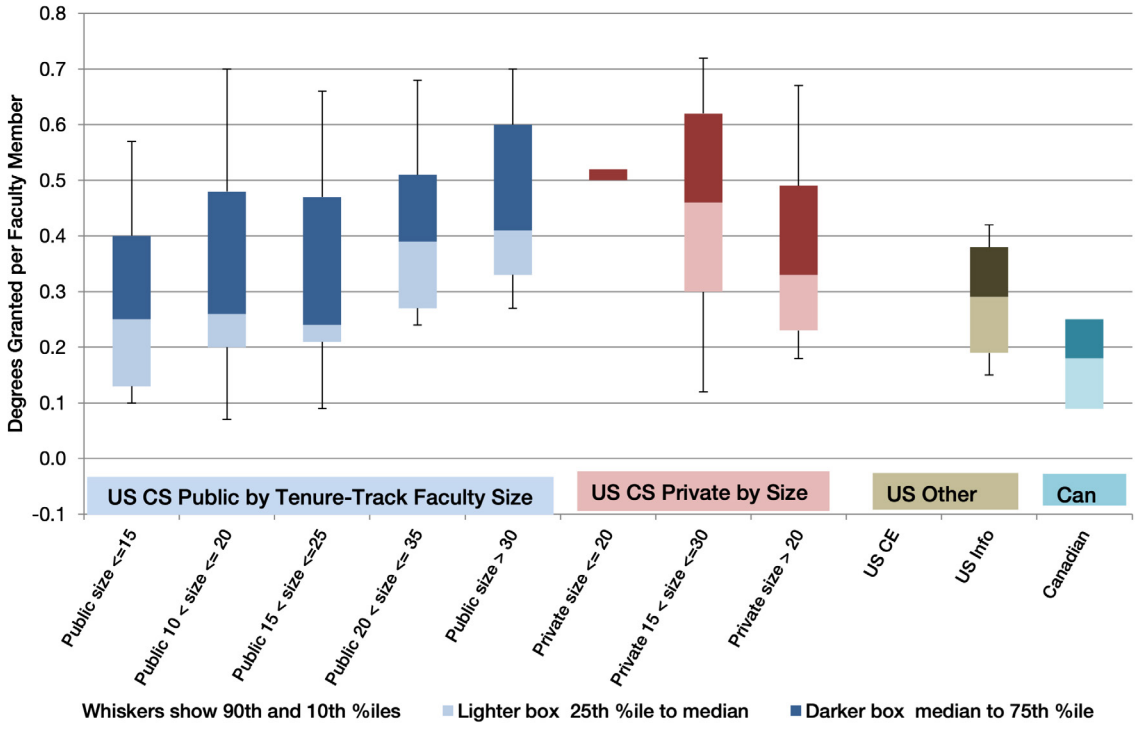
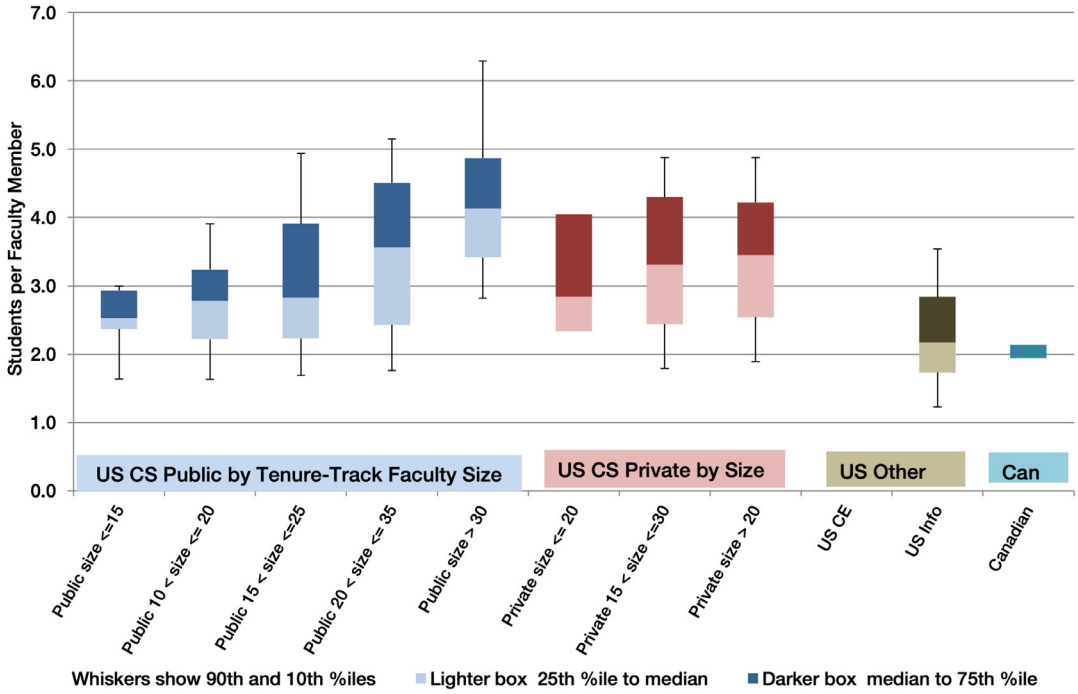
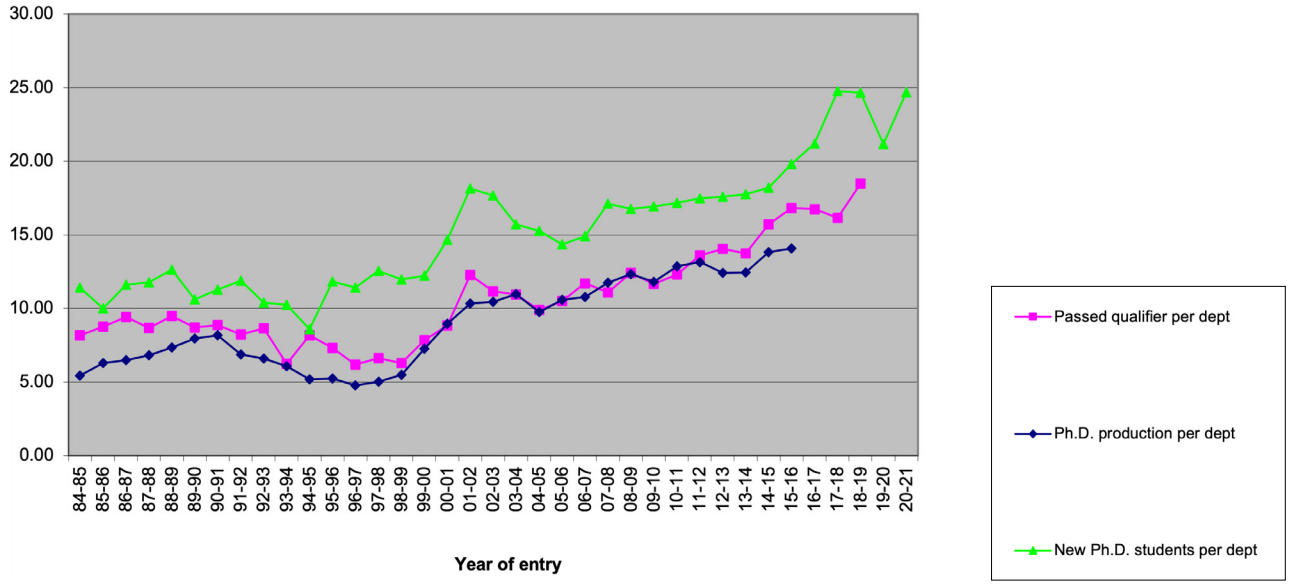



**Figure D4. PhD Enrollment Normalized by Tenure-Track Size**

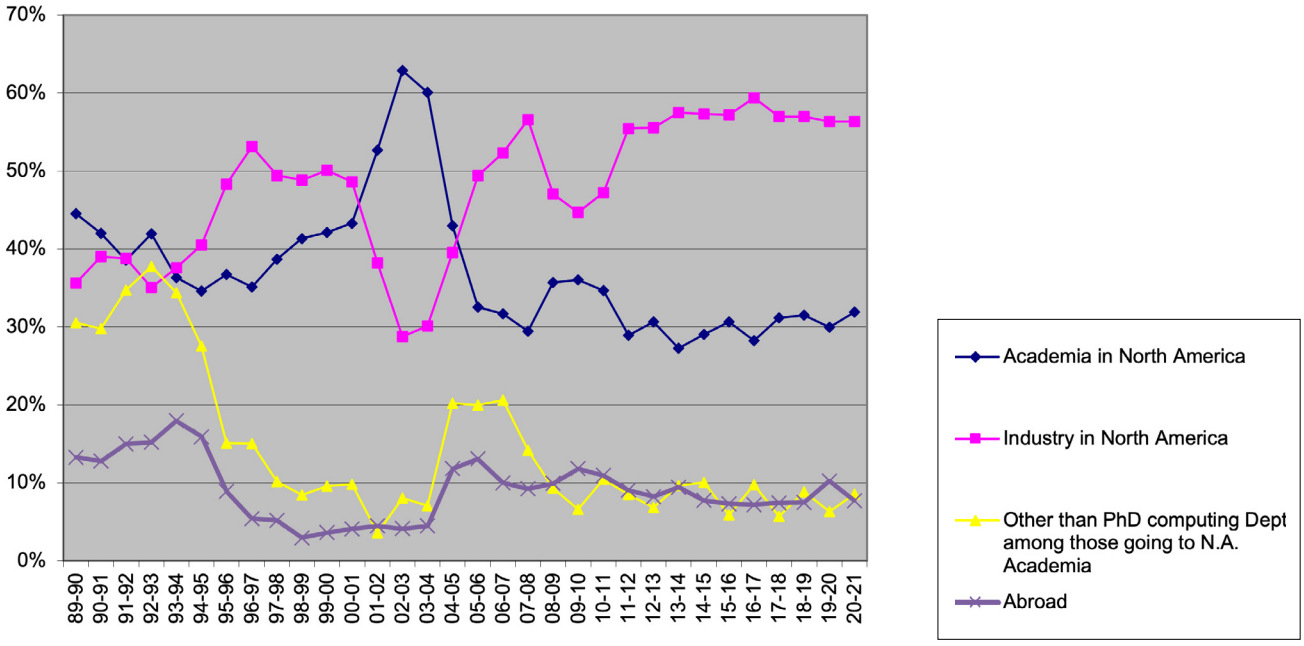
**CRA Taulbee Survey 2021**



### 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

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

**CRA Taulbee Survey 2021**

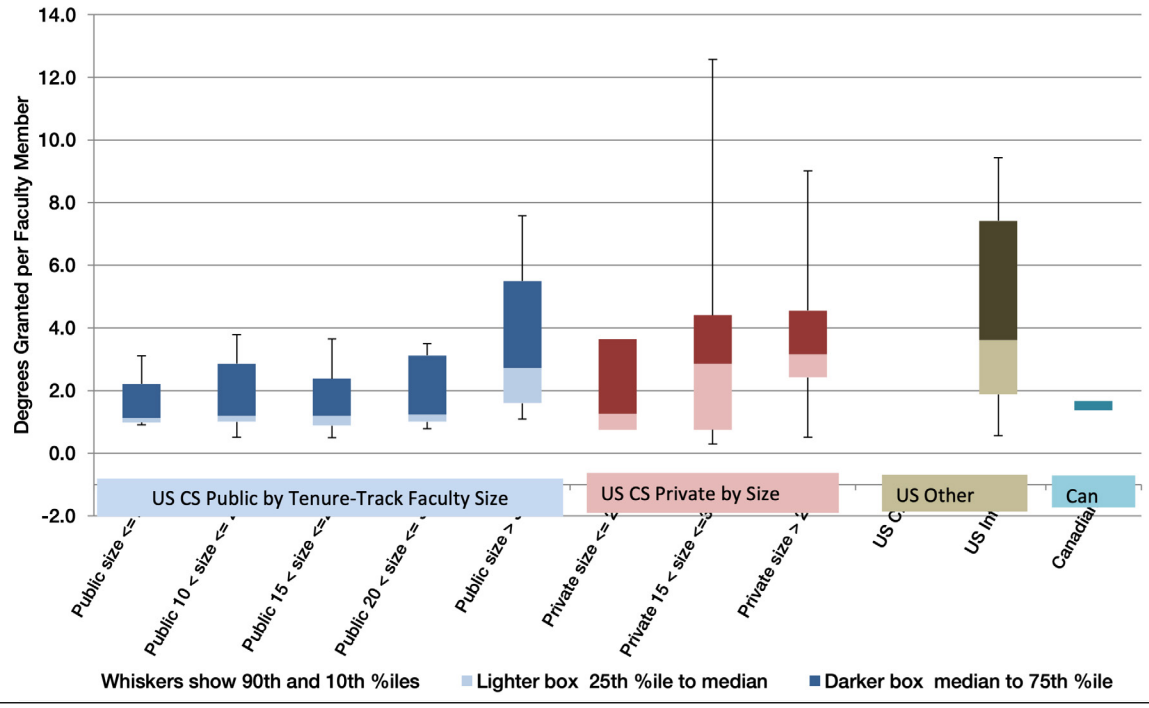
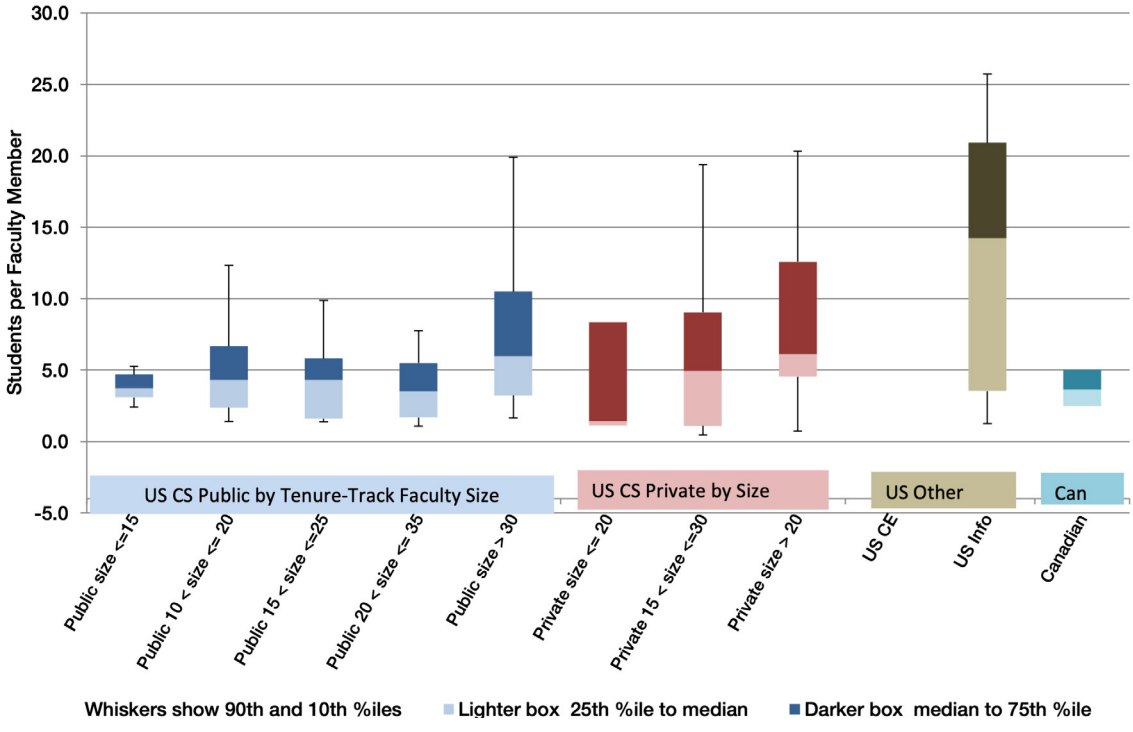



**Figure M2. Master's Enrollment Normalized by Tenure-Track Size**

**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**

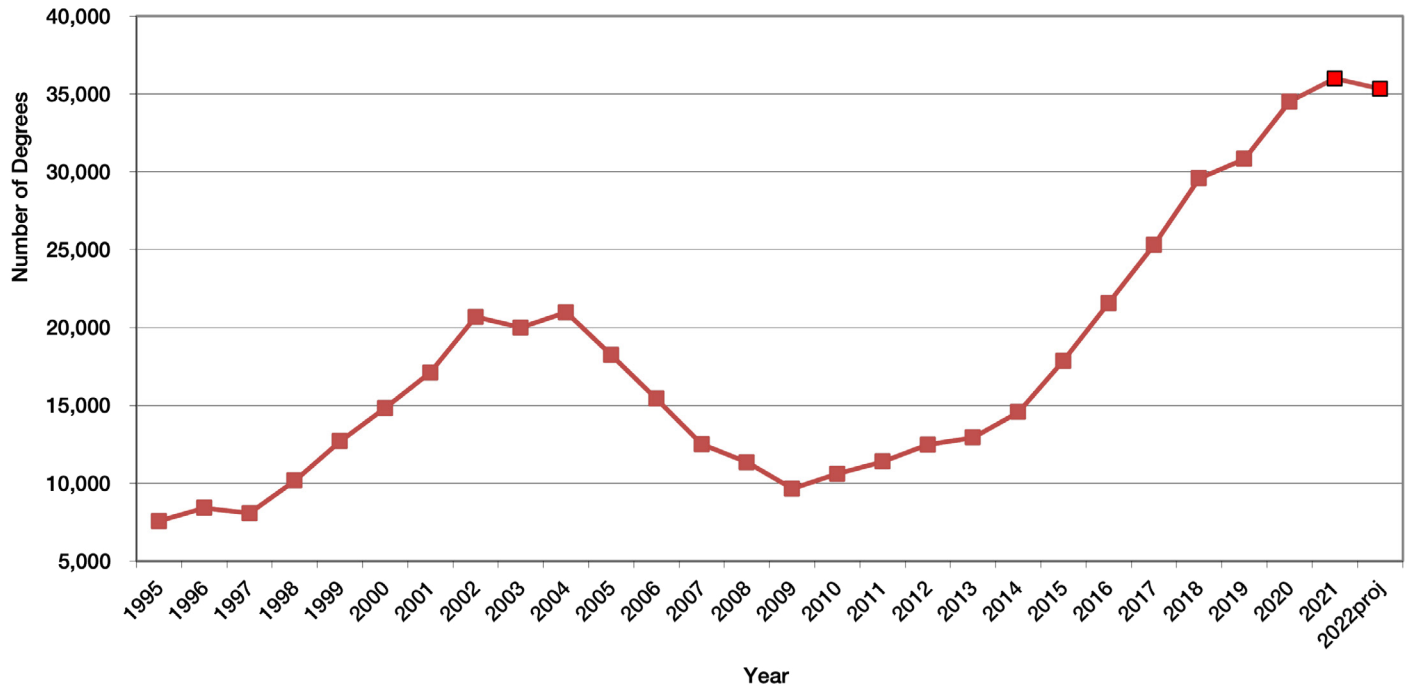



**Figure B2. Newly Declared Undergraduate Majors: CS, CE, and I (beginning in 2008)**

**CRA Taulbee Survey 2021**

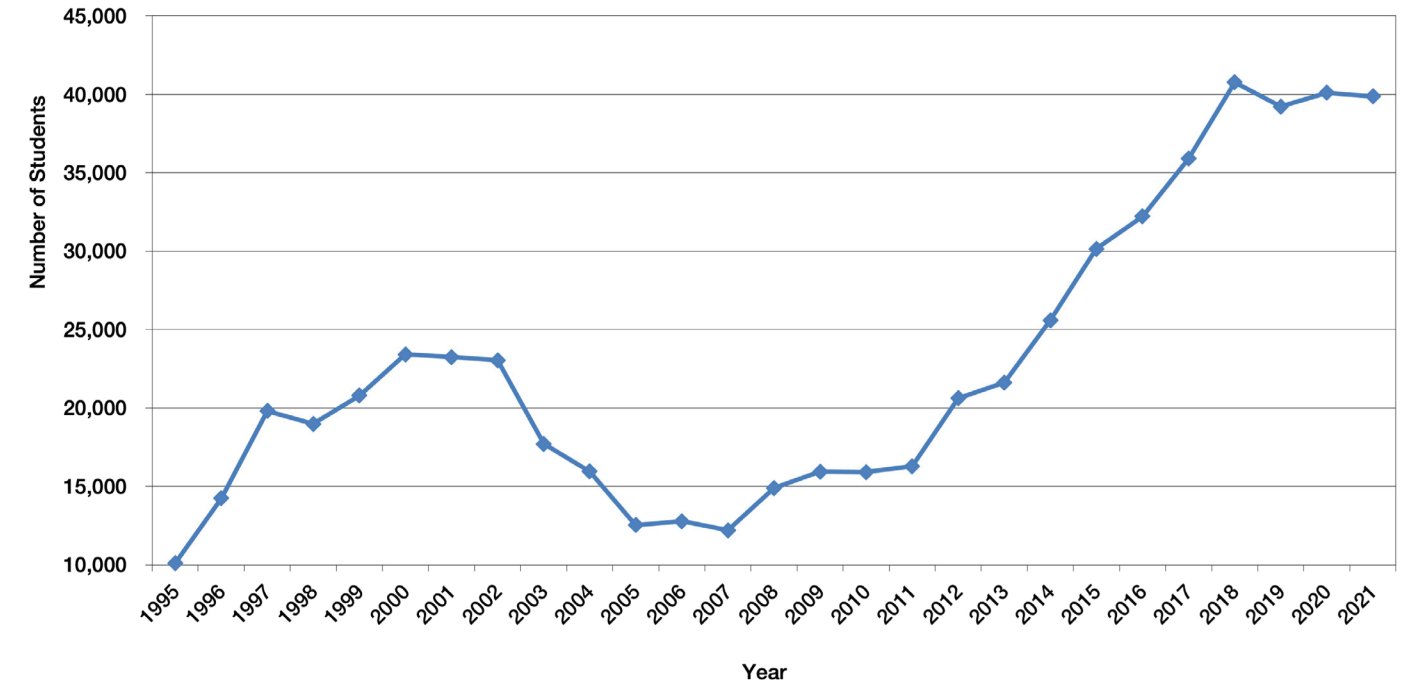


**Figure B3. Bachelor's Degrees Granted by Tenure-Track Size**

**CRA Taulbee Survey 2021**

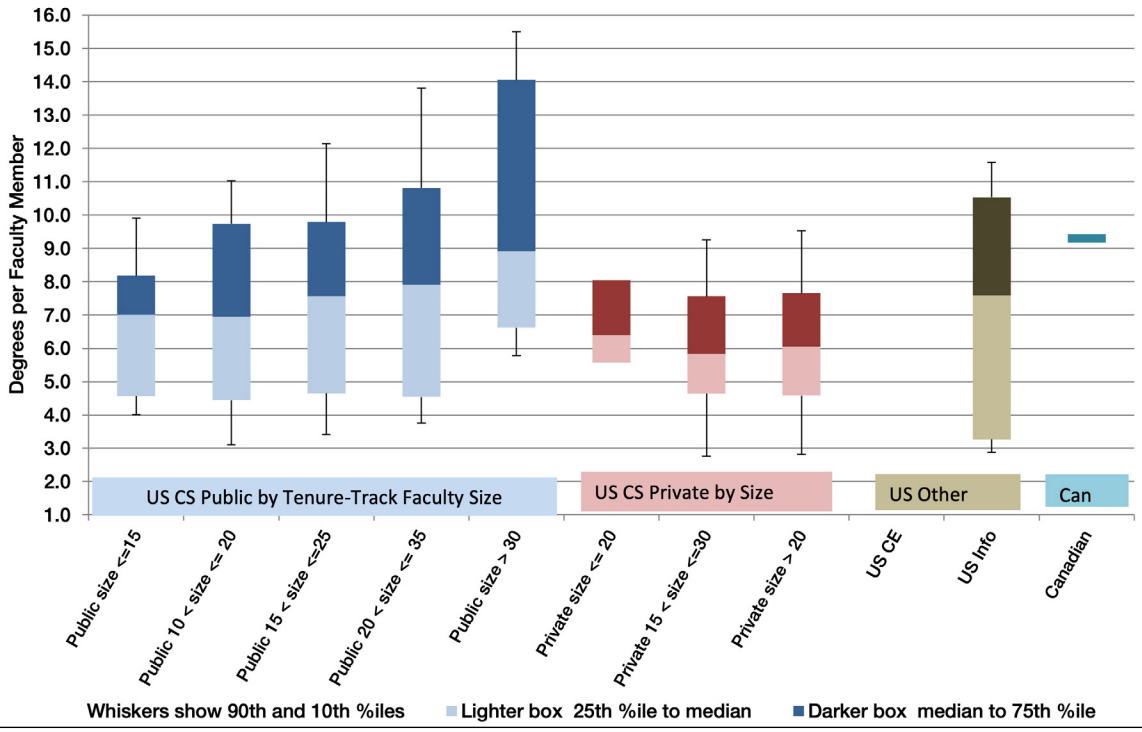



**Figure B4. Bachelor's Enrollment Normalized by Tenure-Track Size**

**CRA Taulbee Survey 2021**

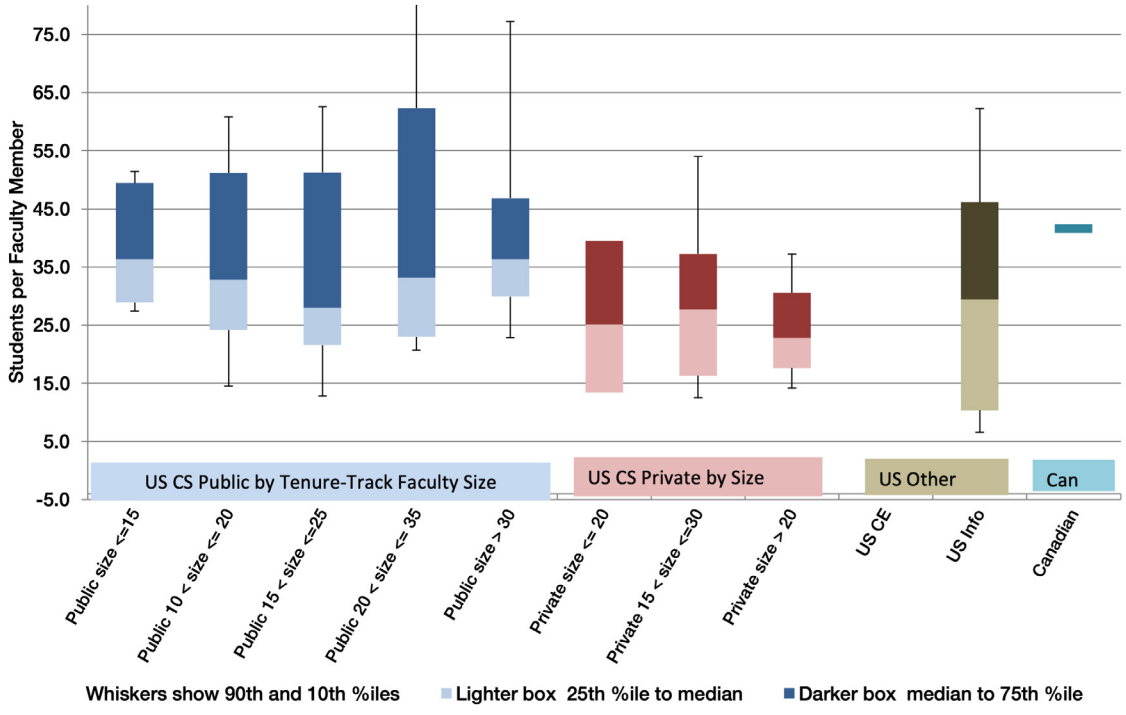
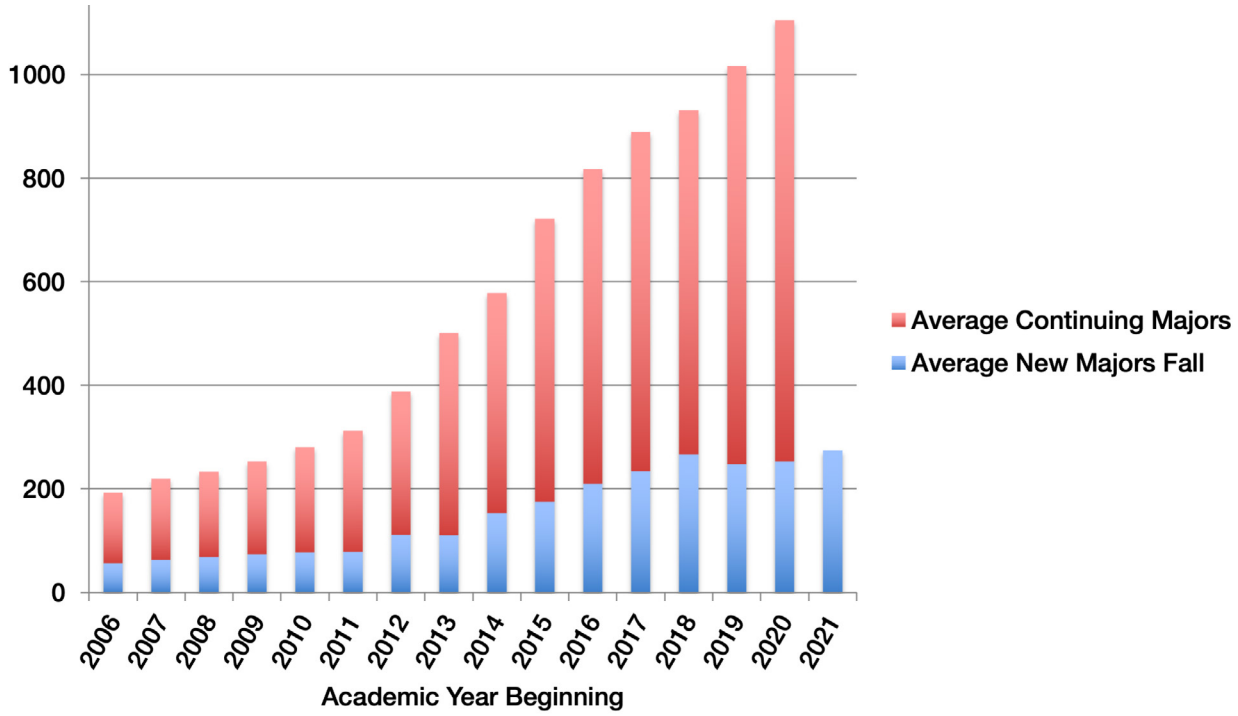


**Figure B5. Average New and Continuing CS Majors per Academic Unit (U.S. CS Programs Only)**

**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**

**CRA Taulbee Survey 2021**

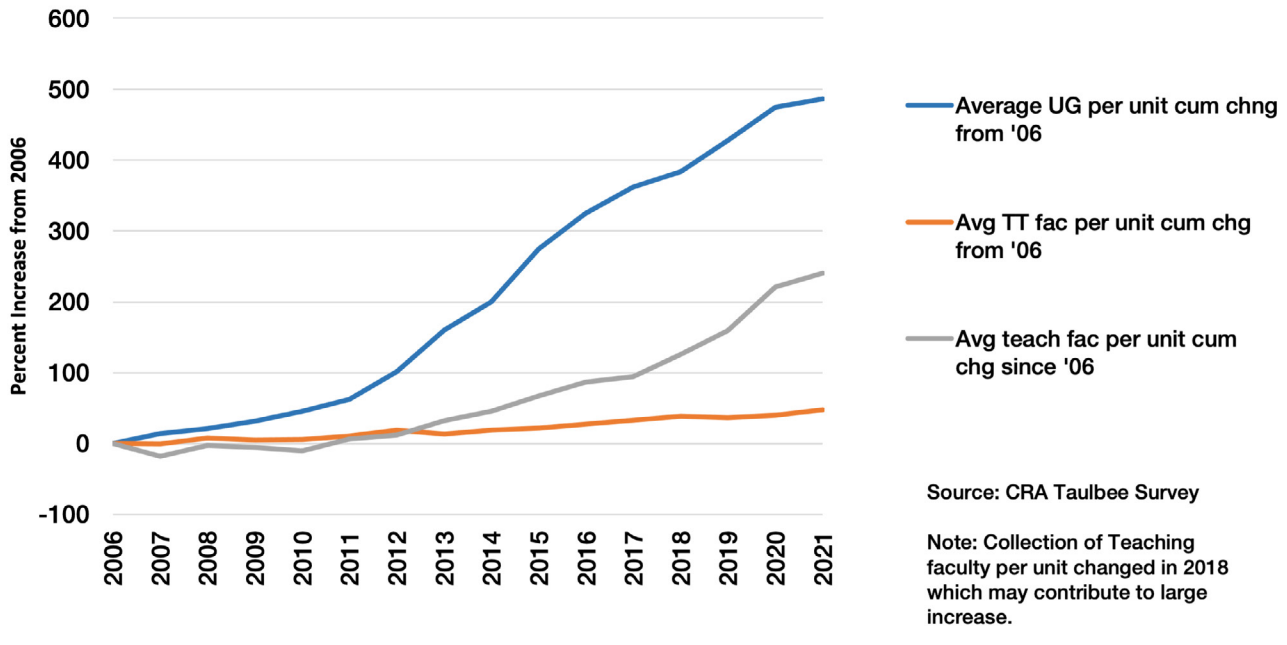


**Table R1. Total Expenditure from External Sources for Computing Research**

| 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**

**CRA Taulbee Survey 2021**

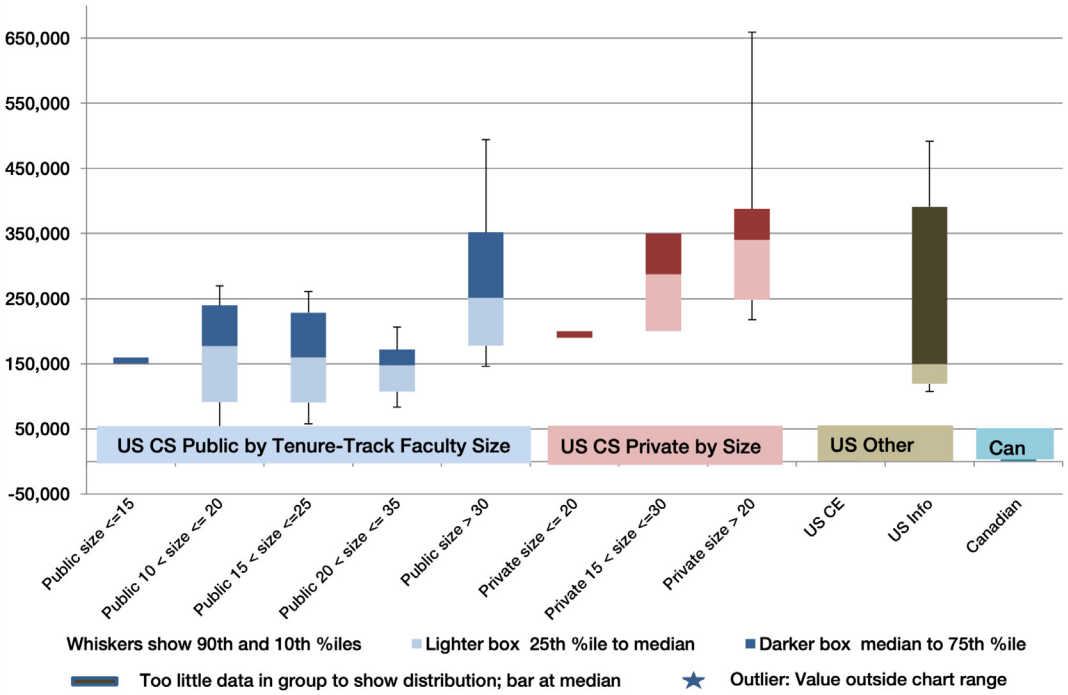
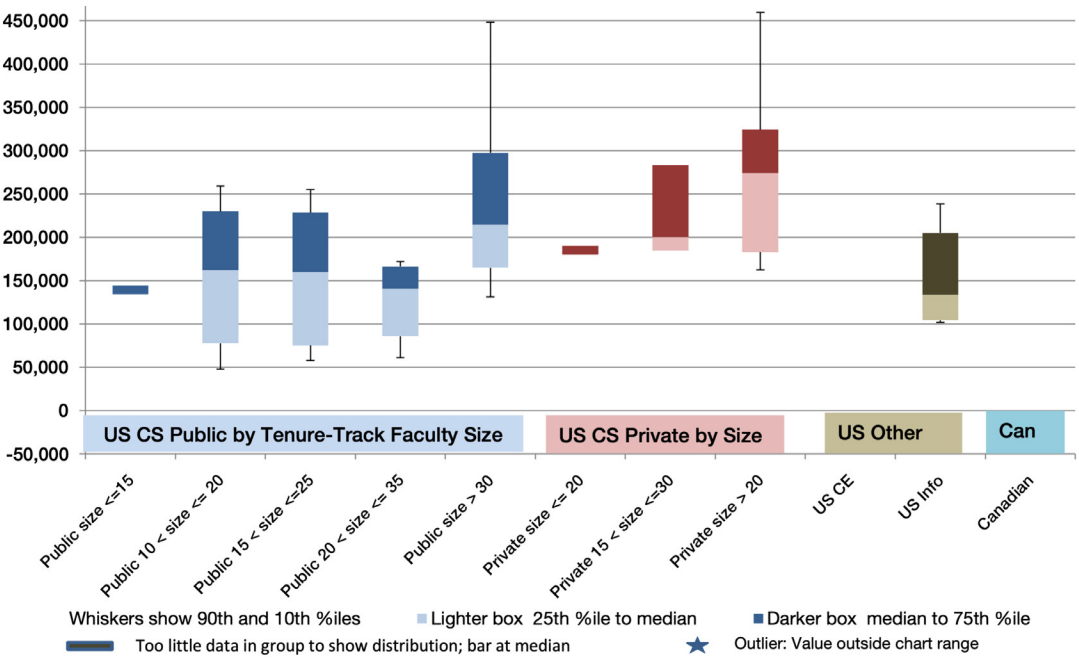



**Figure R2. Research Expenditures Normalized by Tenure-Track + Research Faculty + Postdoctorates**

**CRA Taulbee Survey 2021**



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

CRA Taulbee Survey 2021

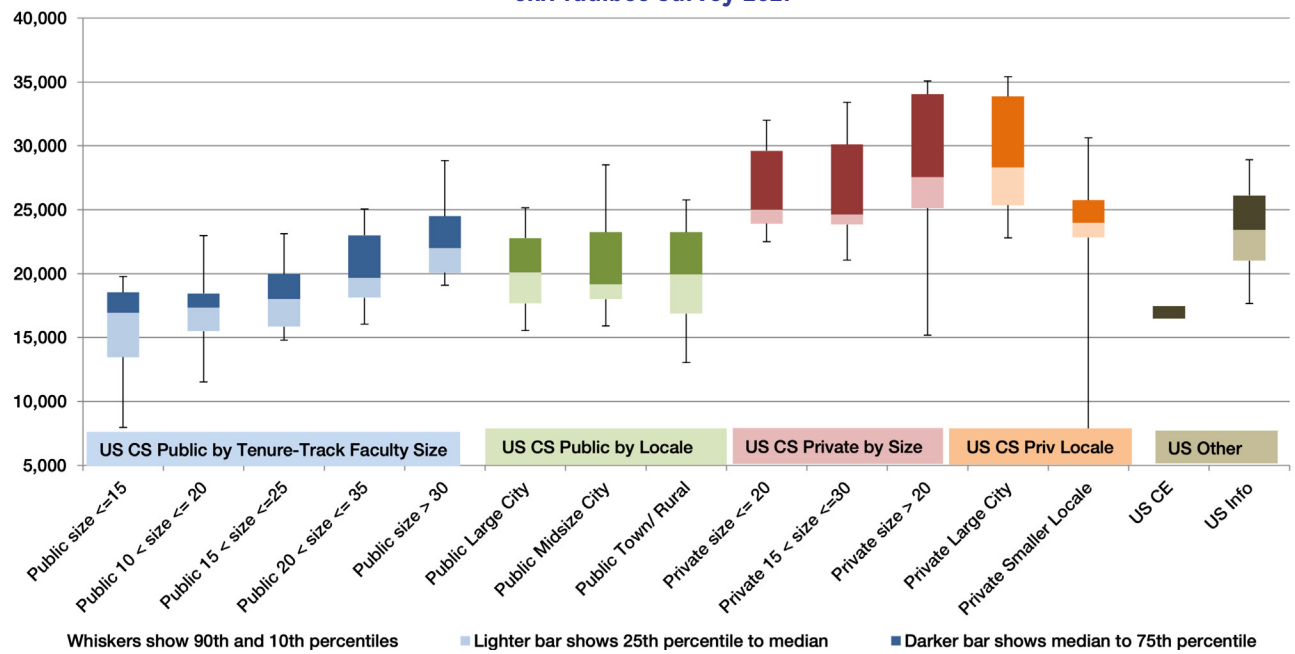


**Figure G2. Research Assistantship Stipends**

**CRA Taulbee Survey 2021**

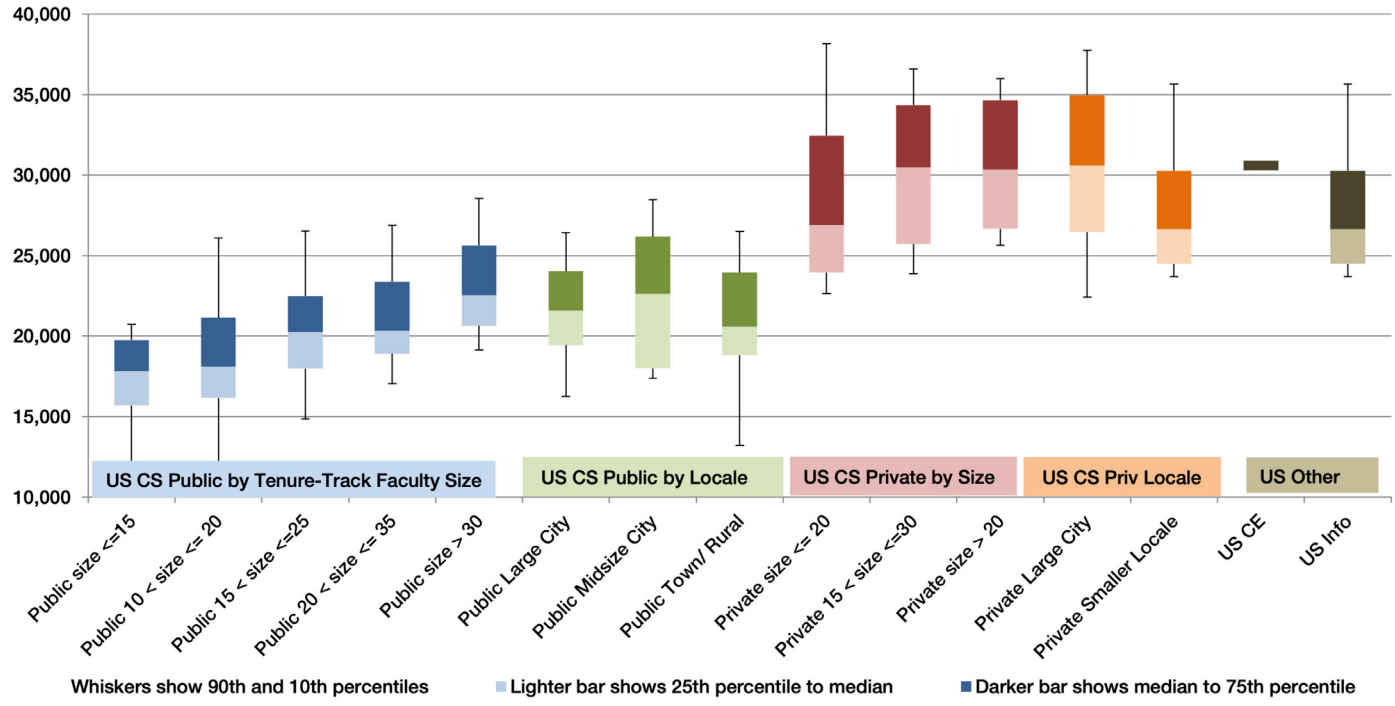
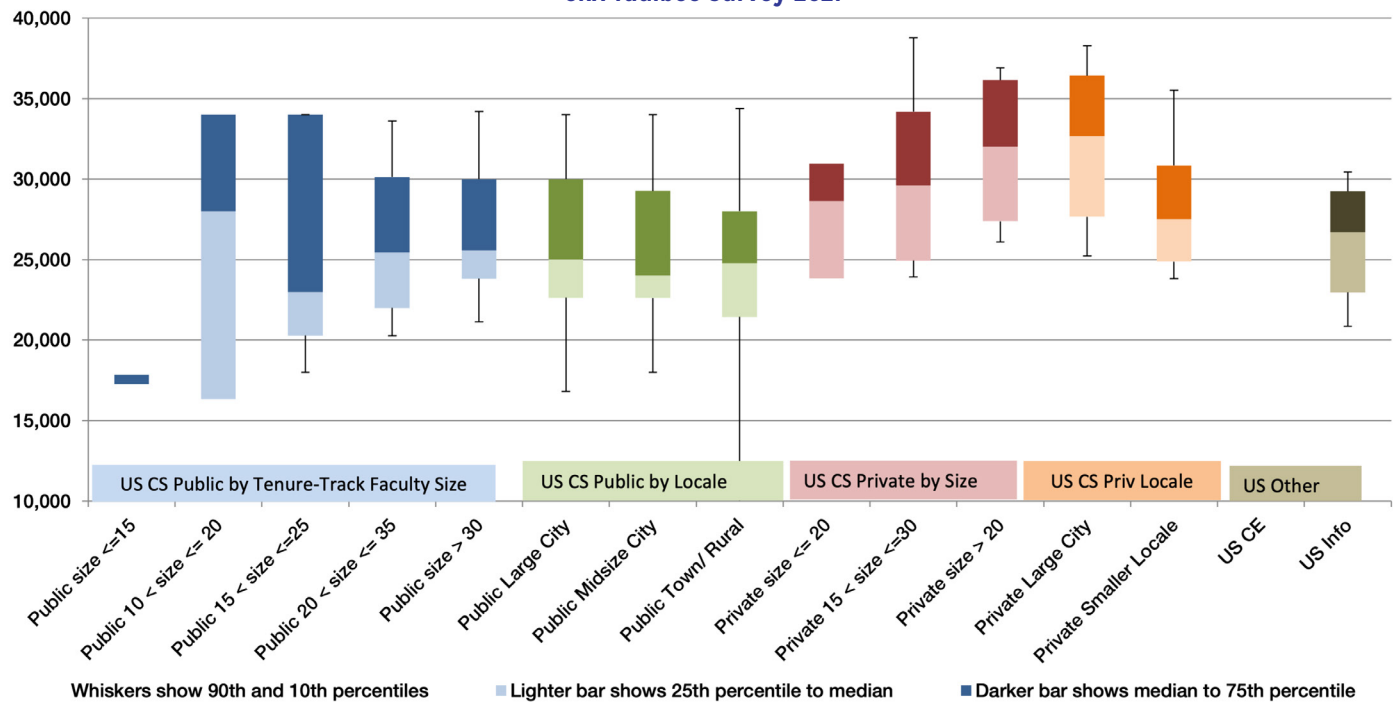



**Figure G3. Full Support Fellows Stipends**

**CRA Taulbee Survey 2021**



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

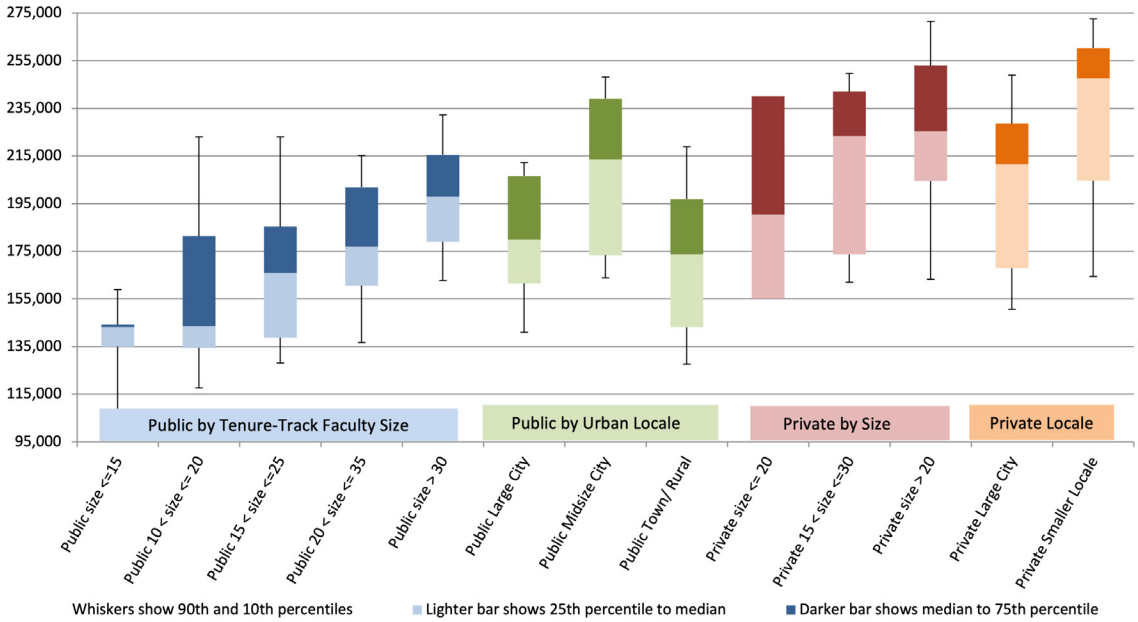


**Figure S2. US CS Department Average Salary, Full Professor in Rank 8-15 Years**

**CRA Taulbee Survey 2021**

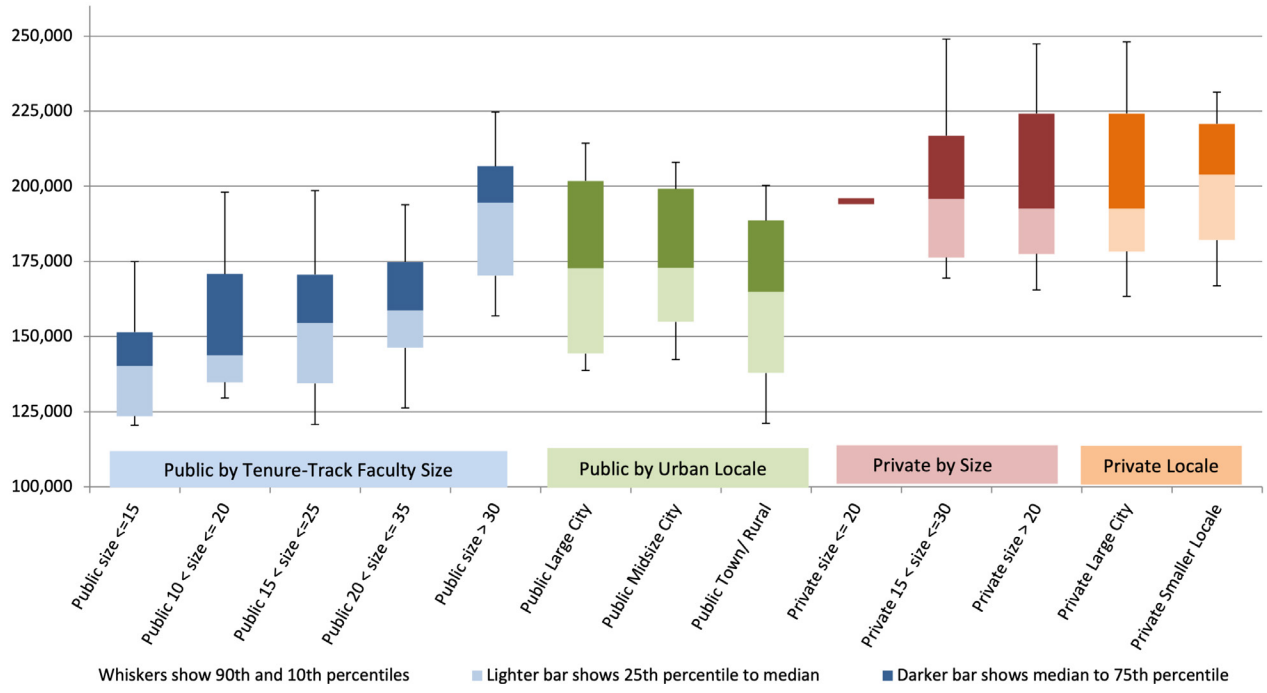



**Figure S3. US CS Department Average Salary, Full Professor in Rank 0-7 Years**

**CRA Taulbee Survey 2021**

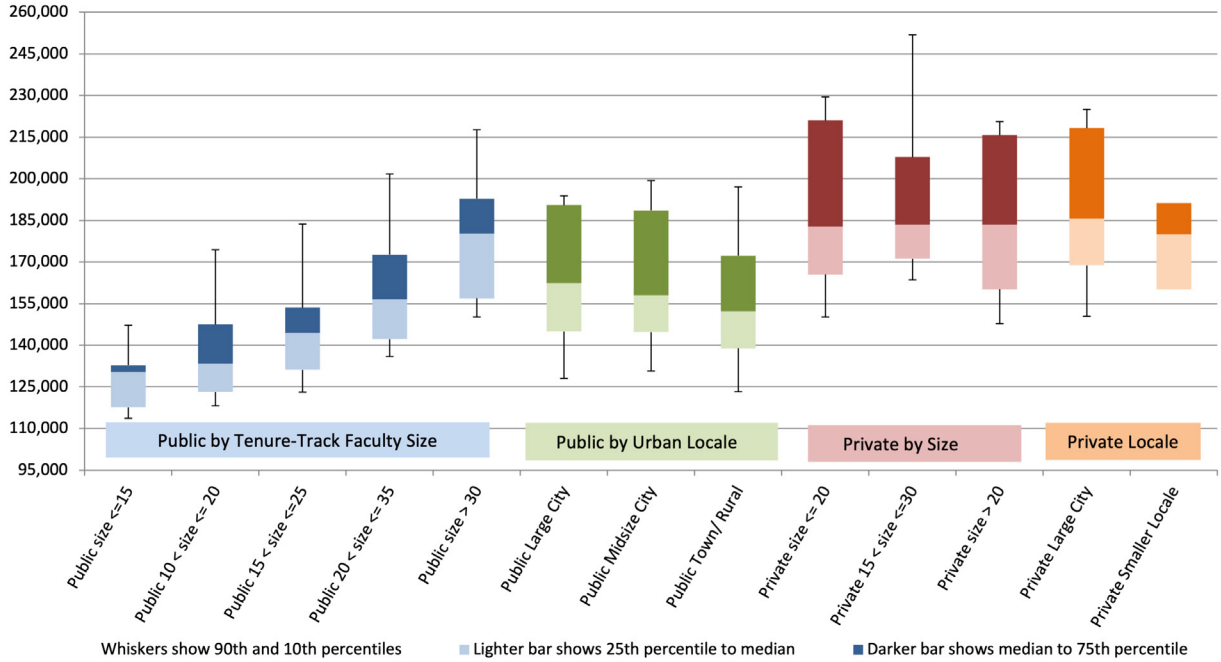


**Figure S4. US CS Department Average Salary, Associate Professor in Rank 8+ Years**

**CRA Taulbee Survey 2021**

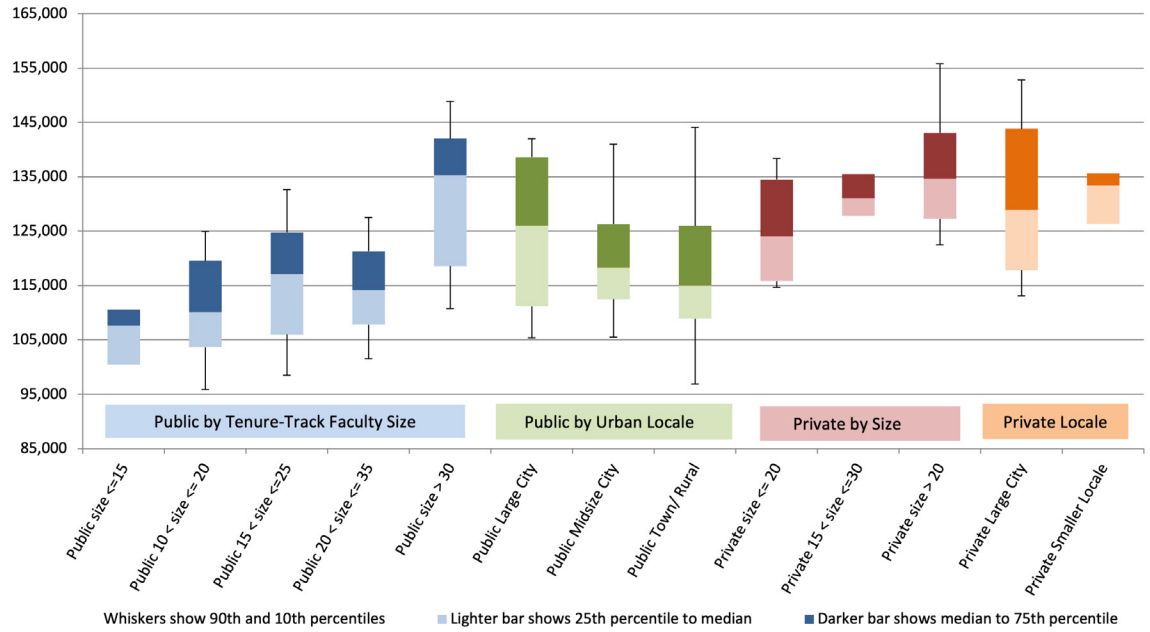



**Figure S5. US CS Department Average Salary, Associate Professor in Rank 0-7 Years**

**CRA Taulbee Survey 2021**

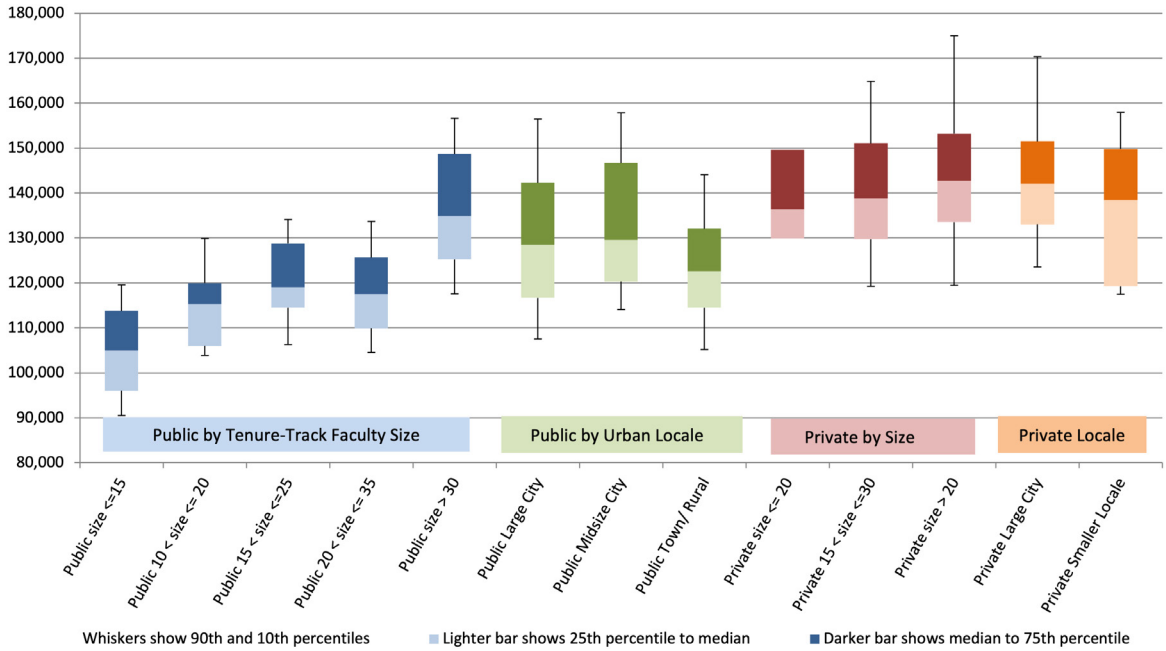


**Figure S6. US CS Department Average Salary, Assistant Professor**

**CRA Taulbee Survey 2021**

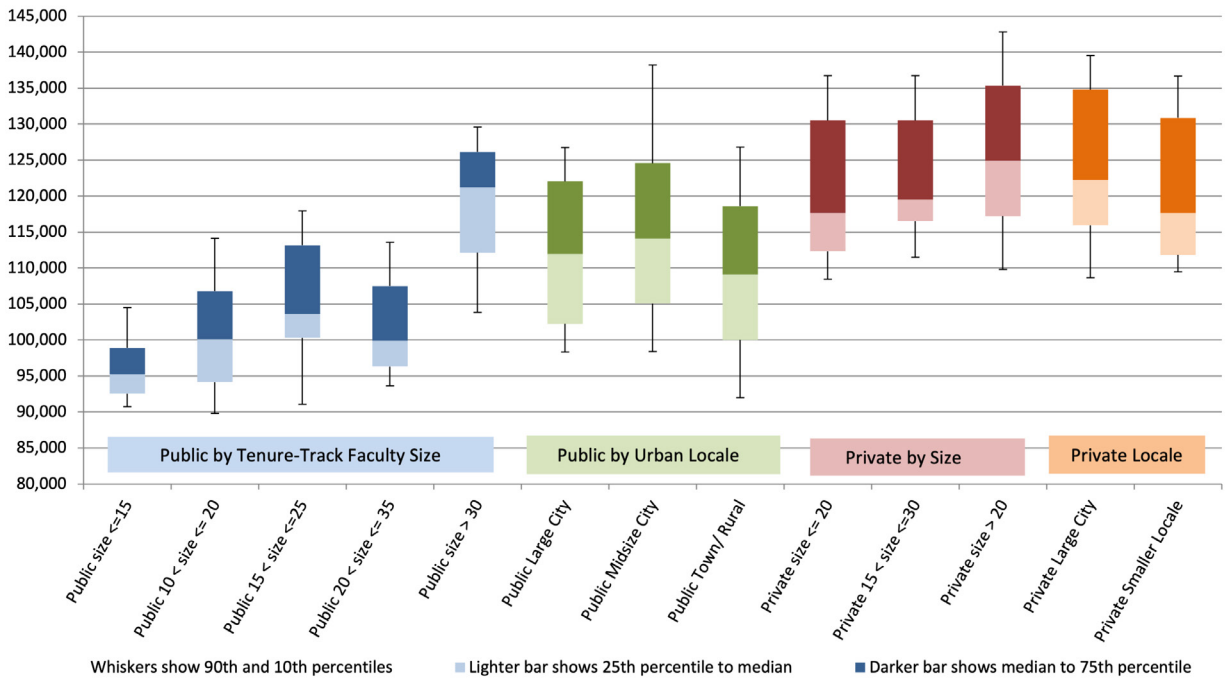



**Figure S7. US CS Department Average Salary, Non-Tenure Track Teaching Faculty**

**CRA Taulbee Survey 2021**

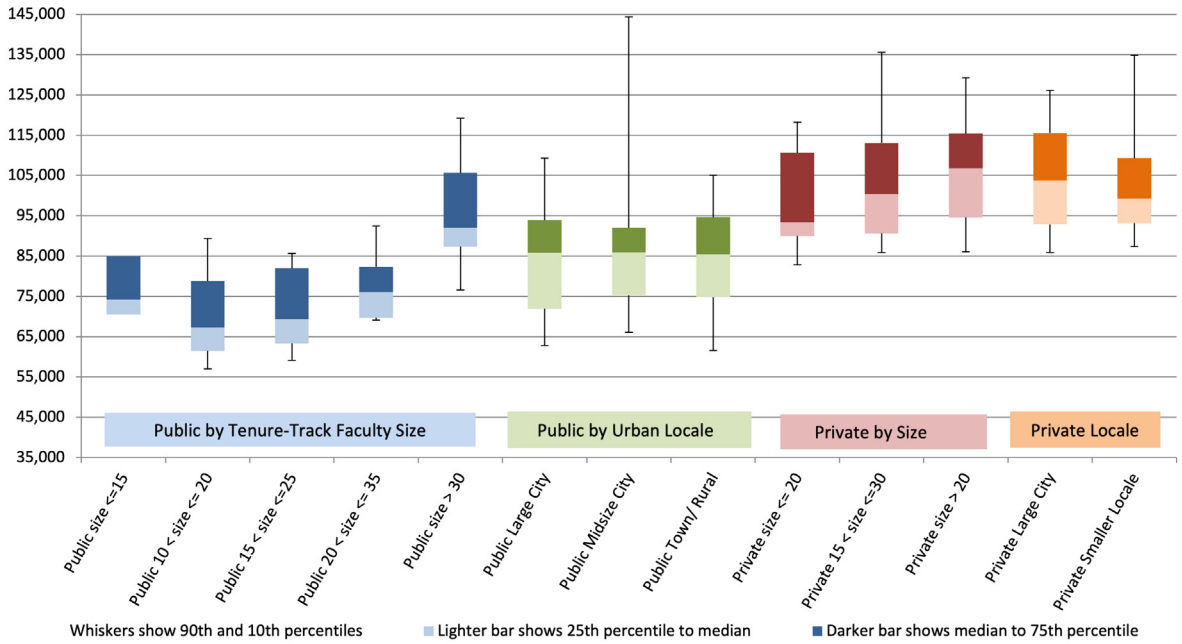


**Figure S8. US CS Department Average Salary, Non-Tenure Track Research Faculty**

**CRA Taulbee Survey 2021**

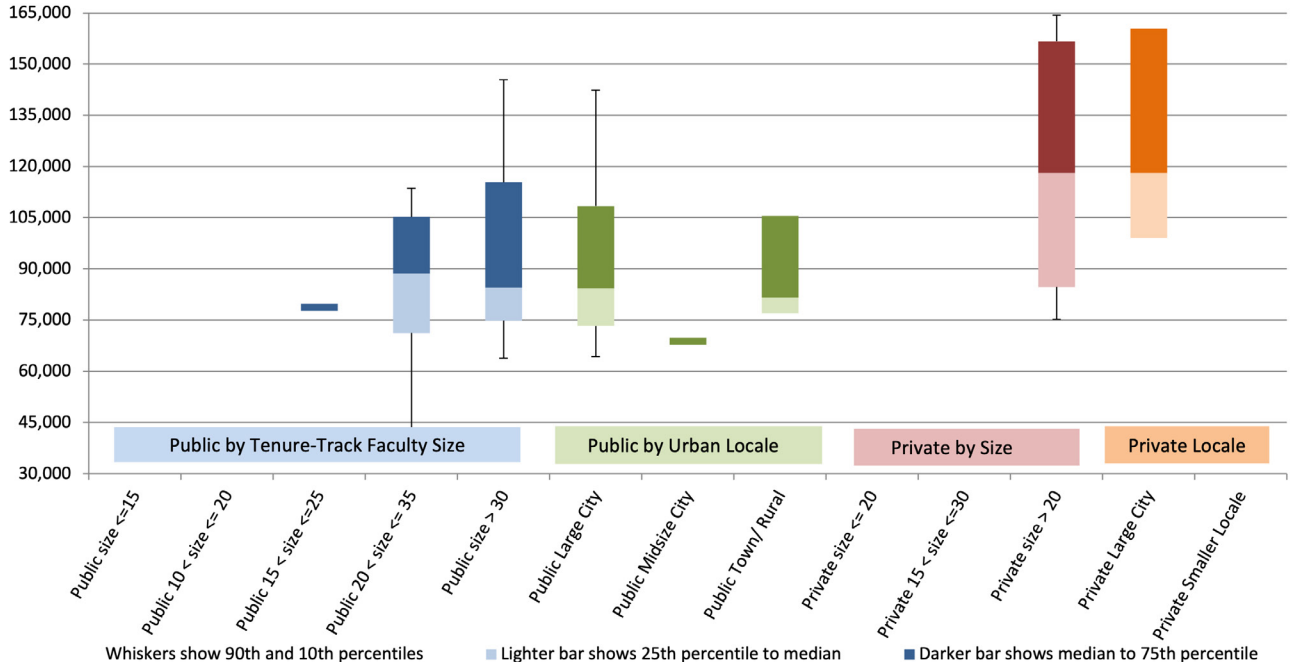
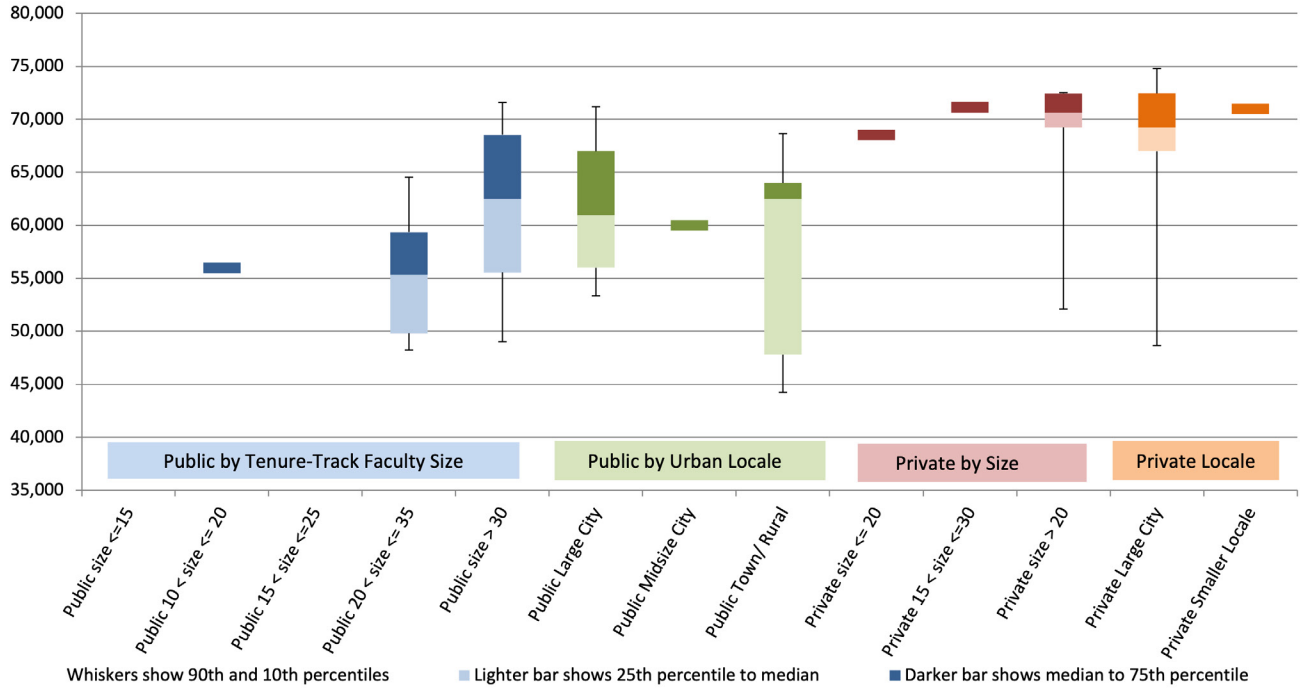



**Figure S9. US CS Department Average Salary, Postdoctorates**

**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.

# CRA-E REU Support Program Survey

Involving undergraduates in research has many benefits, including giving undergraduates a new perspective on opportunities and providing mentorship. Undergraduate research also contributes to the health of the research and PhD pipeline. Information on research and graduate school as well as a course on research methods are not available to all interested undergraduates. The Education Committee of the Computing Research Association (CRA-E) is planning to create a virtual program to fill this need.

CRA-E is asking members of the community who mentor or plan to mentor undergraduate researchers, to complete this brief survey (2 required questions) about the interest in such a program. Our goal is to create a virtual program that educates undergraduate student researchers about research methods, graduate school, and research careers. Students will be engaged in discussions with a research community of their peers, drawn from a broad range of institutions.

Feedback will allow us to better adapt the program to different needs and audiences. For your feedback to have maximum impact, please complete the survey by June 10, 2022.

Survey link: cra.org/crae/REUSurvey

Susanne Hambrusch, Purdue University, CRA-E co-chair

Lori Pollock, University of Delaware, CRA-E co-chair

Kelly Shaw, Williams College, CRA-E Board member

# 2022 CRA Conference at Snowbird Preliminary Agenda

CRA
Computing Research Association

## Conference theme: Socially Responsible Computing Research


This year's CRA Conference at Snowbird will explore the tremendous opportunities for computing research to dramatically benefit the human condition, as well as the related responsibility for computing research to consider the risks inherent in the work we do. Ensuring socially responsible intentions and practices is critical to realizing the future potential of computing research.

Sessions will be broken down into four tracks:

**Track 1: Computing Departments –** Undergraduate and graduate interest in computer science has skyrocketed. This track includes sessions that will explore how to support high-quality, diverse research and teaching in the context of booming enrollments.

**Track 2: Computing Education –** This track looks at areas that are emerging as an important part of the computing research curriculum, including ethics, security and privacy, and data science.

**Track 3: Computing in Industry –** As computing grows ubiquitous, computing research is increasingly important to industry. This track will cover how research is conducted in industry and the partnership between industry and academia.

**Track 4: Computing for Good –** This track will explore the ways that computing research can help create a better future by supporting social justice, removing bias, and driving environmental sustainability.

## Preliminary Agenda

TUESDAY, JULY 19

noon – 4:30 pm

**Inaugural CRA-Industry Meeting**

Co-chairs: Vivek Sarkar (Georgia Tech) and Ben Zorn (Microsoft)

CRA-Industry is a new standing committee of the CRA created with the mission to convene industry partners on computing research topics of mutual interest and connect our partners with CRA's academic and government constituents for mutual benefit and improved societal outcomes. This event at Snowbird is intended to introduce potential industry partners to CRA-Industry and its ongoing activities and discuss ways in which CRA-Industry can most effectively support industry partners.

1:00 – 2:30 pm

**How and Why to Create a Departmental BPC Plan**

Broadening participation in computing (BPC) requires our individual and collective effort. To this end, the National Science Foundation (NSF) Directorate for Computer and Information Science and Engineering (CISE) started an initiative in 2017 to contribute to scaling up the BPC efforts of the computing community.

Specifically, the CISE Directorate introduced a new requirement for Principal Investigators (PIs) to submit a BPC Plan in proposals submitted to a number of their programs. Further, computing departments are also encouraged to develop departmental BPC Plans that map out their strategy for broadening participation in computing within their context, demonstrate their commitment to BPC, and help their faculty develop the BPC Plans required for the proposals submitted to the applicable CISE programs.

There are two kinds of BPC Plans: Departmental BPC Plans and Project BPC Plans. Departmental BPC Plans are 2-page documents that summarize the context, goals, and primary BPC activities of an entire department or another grant-seeking unit. Departmental plans are reviewed and verified by BPC experts who are part of BPCnet.org—a resource clearinghouse for all things related to broadening participation.

This session will give the participants information on how to write Departmental BPC Plans, highlight the resources available to prepare these plans, and discuss the importance of Departmental BPC Plans. Throughout the session, the participants will have the opportunity to ask questions from NSF representatives and BPC experts.

2:00 pm **Registration**

3:00 – 5:45 pm **New Chairs Workshop**
Co-chairs: Carla Brodley (Northeastern University) and Katie Siek (Indiana University)

This workshop will give new CS department chairs some of the skills needed to lead their organizations and work with deans, provosts, and advisory boards – the stuff they never told you in graduate school.

6:00 – 7:00 pm **Welcome Reception**

7:00 – 8:00 pm **Welcome Dinner**
Welcome from the Conference Co-Chairs
50th Anniversary of the CRA
Celebration of Andy Bernat

8:00 pm **After-dinner Keynote**
Dr. Sethuraman "Panch" Panchanathan, Director, National Science Foundation

WEDNESDAY, JULY 20

7:30 – 8:30 am **Registration/Breakfast**

8:30 – 10:00 am **CRA: Looking Forward**

Co-chairs: Ellen Zegura (Georgia Tech), Tracy Camp (CRA), Nancy Amato (University of Illinois), and Andy Bernat (Retired CRA)

CRA has finalized its Strategic Plan, thanks to tremendous effort and excellent input from a large number of community members. In this opening session, we'll share CRA's strategic themes, priority outcomes, and near-term initiatives. Our Strategic Plan, and its focus on socially responsible computing research,

has defined CRA's direction for years to come. CRA will continue to excel in key areas, such as be a source for resources that inform the field, as well as establish itself as a catalyst for computing research organizations to enhance the field. We invite you to learn where CRA is headed, both in the long-term and the short-term, as well as who will help lead us there.

**Awards Presentations**

10:00 – 10:30 am **Break**

10:30 am – noon **The Trusting of Intelligent Machines: How AI Influences Human Behavior**

Chair: Penny Rheingans (University of Maine)

Speaker: Ayanna Howard (The Ohio State University)

People tend to overtrust sophisticated computing devices, including robotic systems. As these systems become more fully interactive with humans during the performance of day-to-day activities, the role of bias in these human-robot interaction scenarios must be more carefully investigated. Bias is a feature of human life that is intertwined, or used interchangeably, with many different names and labels – stereotypes, prejudice, implicit or subconsciously held beliefs. In the digital age, this bias has often been encoded in and can manifest itself through AI algorithms, which humans then take guidance from, resulting in the phenomenon of excessive trust. Trust conveys the concept that when interacting with intelligent systems, humans tend to exhibit similar behaviors as when interacting with other humans; thus, the concern is that people may under-appreciate or misunderstand the risk associated with handing over decisions to an intelligent agent. Bias further impacts this potential risk for trust, or overtrust, in that these systems are learning by mimicking our own thinking processes, inheriting our own implicit biases. Consequently, the propensity for trust and the potential of bias may have a direct impact on the overall quality of the interaction between humans and machines, whether the interaction is in the domains of healthcare, job-placement, or other high-impact life scenarios. In this talk, we will discuss this phenomenon of integrated trust and bias through the lens of intelligent systems that interact with people in scenarios that are realizable in the near-term.

noon **Lunch**

1:30 – 3:00 pm **Parallel Tracks**

**Track 1: Booming Enrollments While Broadening Participation in Computing**

Co-chairs: Nancy Amato (University of Illinois) and Carla Brodley (Northeastern University)

Moderator: Nancy Amato (University of Illinois)

Speakers: Christine Alvarado (University of California, San Diego), Carla Brodley (Northeastern University), and Craig Partridge (Colorado State University)

Demand for undergraduate degrees in computing has increased rapidly in the last few years and shows no signs of abating. Many universities have put enrollment caps into place for various reasons including being unable to hire sufficient faculty to keep up with student demand, or to maintain balance between

disciplines across the university. An inability to hire sufficient faculty is in part due to great demand and competition in the job market but also frequently due to lack of resources, which can be hindered by a university's adaptability in reapportioning resources quickly. COVID has exacerbated the gap between student demand and faculty resources due to hiring freezes at some universities. In this panel we discuss the ways in which universities are handling booming enrollments and their positive/negative impact on broadening participation in computing. **In particular, we will discuss how to effectively scale introductory classes, fair/unfair ways to cap enrollments, and how interdisciplinary computing majors can provide a solution to booming enrollments.**

### Track 2: Incorporating Ethics into Computer Science Education

Co-chairs: Kathy Pham (Mozilla/Harvard) and Bobby Schnabel (University of Colorado, Boulder)

Speakers: Casey Fiesler (University of Colorado, Boulder), Helena Mentis (University of Maryland Baltimore County), Kathy Pham (Mozilla/Harvard), Atri Rudra (SUNY Buffalo), and Bobby Schnabel (University of Colorado, Boulder)

In recent years, there has been a surge of attention into incorporating ethics into education in computer science and related fields. This is taking a variety of approaches, including integrating ethics topics into core technical computer science courses, and standalone ethics and computing courses that in some cases involve partnerships with other disciplines. This panel will summarize some of these recent developments, including examples from the Responsible Computer Science Challenge that is integrating ethics into undergraduate computer science courses, and experience in standalone courses at undergraduate and graduate levels. It also will discuss repository created by an ACM Education Board task force that collects and provides materials that aid faculty in teaching ethics in computing topics. The panel will consist of fairly brief presentations followed by considerable time for discussion with the audience.

### Track 3: Computing Research in Industry

Chair/Moderator: Jaime Teevan (Microsoft)

Speakers: Susan Dumais (Microsoft), Fernando Pereira (Google), Manuela Veloso (JPMorgan Chase) and Kristin Lauter (Meta)

Computation is in the process of transforming all areas of a business, from the way work gets done to the products and services that are created. As a result, companies are increasingly investing in fundamental computer science research in support of their strategic goals. This panel will look at what it means to do computing research in an industrial setting. Panelists will describe how research is conducted in their organizations, highlighting how problems are selected, how research is incentivized, and how results have internal and external impact. They will also discuss some of the key differences of doing research in an industrial setting compared with an academic setting, and share ideas for how universities might best prepare their students for a career in industrial research.

**Track 4: Climate-Smart Computing to Address a Grand Challenge Facing Our Changing Planet**

Co-chairs: Kate Larson (University of Waterloo) and Shashi Shekhar (University of Minnesota)

Speakers: Andrew A. Chien (University of Chicago), Vandana Janeja (University of Maryland, Baltimore County), Vipin Kumar (University of Minnesota) and Ran Libeskind-Hadas (Claremont McKenna College)

Climate change has been declared as the defining crisis of our time and concrete actions are needed now. Many communities have started major initiatives to address climate change. For example, the Biden administration has made it a central priority for all federal agencies resulting in initiatives for reducing greenhouse gases (GHG) emissions (e.g., electric vehicles), absorbing GHG (e.g., forests), increasing resilience (sea level rise, forest fires, extreme cold/hot weather), etc. This panel will bring together thought leaders in academia, industry and government to explore climate-smart computing opportunities by addressing questions such as the following:

- What is climate-smart computing? What may it help understand, mitigate, and adapt to climate change? How may we reduce computing's carbon footprint?
- What are computing research success stories in this area?
- What are major computing opportunities in this area?
- How may new computing researchers get involved?
- What are key research infrastructures (e.g., datasets, cyberinfrastructure, funding)?
- Is there a need for computing research community action? If so, recommend one.

3:00 – 3:30 pm **Break**

3:30 – 6:30 pm **Networking Activities**
Guided Hikes
Alternative talking/interacting activity

6:30 pm **Dinner**

Reboot!

The CCC Council embarked on a new activity this year to generate new ideas for us to explore as a community. In this session, we will have a set of lively, provocative conversations about three of these "blue sky" topics.

Organizer: CRA's Computing Community Consortium - Ann Schwartz (CRA)

Speakers: Sujata Banerjee (VMWare), Nadya Bliss (Arizona State University), Bill Gropp (University of Illinois) and Dan Lopresti (Lehigh University)

Moderator: Liz Bradley (University of Colorado Boulder)

# Agenda *(continued)*

THURSDAY, JULY 21

7:30 – 8:30 am **Breakfast**

9:00 – 10:00 am **Reports from the Computing Research Community**

Speakers: Amruth Kumar (Ramapo College of New Jersey), Rajendra Raj (Rochester Institute of Technology), Kristen Shinohara (Rochester Institute of Technology), Elizabeth Mynatt (Northeastern University), Amanda Stent (Colby College) and Liz Bradley (University of Colorado)

This session will highlight recent developments and reports from across the computing research community. Each presenter will provide a brief overview of their report and findings, and then audience members will participate in short, guided table-discussions around the themes introduced in the presentation. The goal of the session is to spur conversation at Snowbird on topics that are important to the computing research community and provide a teaser into a larger body work that inspires audience members to learn more after the session.

10:00 am **Break**

10:30 am **Parallel Tracks**

**Track 1: Development of Teaching Faculty**

Chair/Moderator: Ran Libeskind-Hadas (Claremont McKenna College)

Speakers: Christine Alvarado (University of California, San Diego), Nancy Amato (University of Illinois), Dan Grossman (University of Washington) and Susan Rodger (Duke University)

Teaching faculty play a critically important role in undergraduate CS education at large research universities. These faculty members contribute to their departments in multiple ways including, but not limited to, teaching very large introductory sequence courses and promoting pedagogical innovations that can benefit the entire department. This session addresses effective practices in recruiting, retaining, and mentoring teaching faculty. Among the questions that will be addressed are:

- What are effective models for teaching track faculty positions in terms of teaching, scholarship, and service expectations and responsibilities?
- What are effective practices in recruiting and mentoring teaching track faculty members?
- What are good practices in reviewing, renewing, and promoting teaching faculty?
- What are good practices and trends with respect to contract duration and security of employment for teaching track faculty?

**Track 2: Security and Privacy Education**

Chair/Moderator: Lorrie Cranor (Carnegie Mellon University)

Speakers: Patrick McDaniel (The Pennsylvania State University), Bo Yuan (Rochester Institute of Technology), Matt Bishop (University of California, Davis) and Michael Bailey (Georgia Tech)

Companies are reporting a growing shortage of qualified cybersecurity professionals, with hundreds of thousands of jobs going unfilled. New privacy laws around the world are also leading to rapid growth in the privacy profession, with an increased demand for privacy engineers. The demand for security and privacy professionals has prompted the creation of new degree programs at all levels. In addition, some universities are finding ways to incorporate security and privacy lessons throughout their computer science curricula. Panelists will discuss security and privacy undergraduate and graduate education, including course modules, full courses, and entire degree programs devoted to these areas.

### Track 3: Industry-Academia Partnerships

Chair/Moderator: Divesh Srivastava (AT&T)

Speakers: Elizabeth Mynatt (Northeastern University), Chris Ramming (VMWare), Jennifer Rexford (Princeton University), Vivek Sarkar (Georgia Tech), and Benjamin Zorn (Microsoft)

In 2015, the CCC co-sponsored an industry round table that produced the document "The Future of Computing Research: Industry-Academic Collaborations." Since then, several important trends in computing research have emerged as described in the CCC document "Evolving Academia/Industry Relations in Computing Research." These trends include: (i) significant increases in the level of interaction between professors and companies in certain computing disciplines such as currently AI, which take the form of extended joint appointments, and (ii) increasingly, companies are highly motivated to engage both professors and graduate students working in specific technical areas, because companies view computing research and technical talent as a core aspect of their business success. This increasing connection between faculty, students, and companies has the potential to change (either positively or negatively) numerous things, including: (a) the academic culture in computing research universities, (b) the research topics that faculty and students pursue, (c) the ability to solve bigger problems with bigger impact than what academia can do alone, (d) the ability of universities to train undergraduate and graduate students, (e) how companies and universities cooperate, share, and interact, and (f) the potential for principles and values from academia informing products and R&D roadmaps in new ways through these unique joint arrangements. A recent survey carried out by CRA measures the degree and impact of this trend. This session brings together a diverse set of participants from industry and academia to understand these trends and help identify best practices that can be shared widely among computing research institutions.

### Track 4: From Fairness to Responsibility: Actioning and Advancing the Discussion around "Algorithmic bias"

Co-chairs: Brent Hecht (Microsoft)

Moderator: Brent Hecht (Microsoft)

Speakers: Miranda Bogen (Meta), Michael Kearns (University of Pennsylvania) and Maria De-Arteaga (UT Austin)

At the beginning of the last decade, the domain popularly known as "algorithmic bias" was a niche research area being advanced by a tiny group of scholars. By the end of the decade, "algorithmic bias" had become one of the most prominent domains of computing and a subject of great interest to policymakers and the

general public. Anytime a field grows this quickly, it can be useful to stop and reflect on the field's strategic directions. In this panel, we will take part in this reflection. Some of the questions we will debate include:

- Is the computing community focusing on symptoms of problems related to "algorithmic bias" rather than their causes?
- Rather than attempting to tweak models, is our time better spent developing new technologies and systems that directly address societal harms?
- How can industry and academia productively collaborate on responsible AI, especially given concerns about "ethics washing"? How can industry productively contribute more generally?
- Can a repositioning of the field around responsibility rather than fairness encourage more robust solutions to the problems at the core of "algorithmic bias"?
- How can the research and engineering practices around fairness (and responsibility) match the urgency and needs emerging from AI systems entering the world in diverse ways?
- Are there ways in which productizing ideas in the fairness literature can lead to more harm than good, e.g., through a belief that a model's "bias can be fixed"? If so, how can we prevent this from happening?

noon **Lunch**

1:30 pm **Parallel Tracks**

### Track 1: Undergraduate Research and Booming Enrollments: Who Wins

Co-chairs: Christine Alvarado (UC San Diego) and Kelly Shaw (Williams College)

Moderator: Kelly Shaw (Williams College)

Speakers: Edward Coyle (Georgia Tech), Sarah Heckman (North Carolina State), Joe Hummel (University of Illinois, Chicago) and Brandon Fain (Duke University)

While the boom in enrollment has created significant challenges to CS units, it also provides opportunity to increase the supply of talented and well-educated computing researchers.

The challenge faced by units with surging enrollments is how to scale undergraduate research opportunities to reach the increasing number of exceptionally capable and well-motivated students. The major goals for this session are: (1) increasing awareness of different approaches/programs that units have established towards scaling undergraduate research in CS and CS-related fields and (2) enabling replication of such programs with best practices.

The session will highlight successful scaling strategies with particular focus on successful research training support courses, incentive structures for faculty and students, mentoring structures, and recruitment and matching models. Panelists will discuss what activities can be done in groups for training and mentoring undergraduate researchers and models for offering those activities as well as promising approaches for faculty incentives to participate in undergraduate research.

### Track 2: Data Science in Computer Science Education

Chair/Moderator: David Ebert (University of Oklahoma)

Speakers: Michael Franklin (University of Chicago), Magda Bałazinska (University of Washington), and Atul Prakash (University of Michigan)

The 2016 CRA Report on Computing Research and the Emerging Field of Data Science, highlighted the fact that data science will drive fundamentally new research in computer science and that the computing community has the opportunity to shape the emerging field of data science. Numerous schools have created minors and majors in data science. This session will explore how data science has impacted the educational programs in computer science and consider experiences, approaches, and answers to questions including:

- Which courses should change/have changed to include data science issues?
- What new course and requirements are the most effective?
- Are most departments creating a series of specialized topic courses (e.g., ICR)?
- Should we create new specializations/degrees or integrate into core programs?
- How has student interest in specialization shifted to data science or is the shift just specifically to Machine Learning and AI?
- How should we manage the growing demand, and will it continue?

### Track 3: Techlash in Context: What Should CS Departments and Tech Companies Do?

Chair/Moderator: Vivek Sarkar (Georgia Tech)

Speakers: Lorrie Cranor (Carnegie Mellon University), Alfred Spector (Google), Moshe Vardi (Rice University) and Nirit Weiss-Blatt (Author of "The Techlash and Tech Crisis Communication")

In past decades, CS departments and tech companies have been admired as drivers of positive change. However, there is now a growing undercurrent of negative associations with tech companies, which is also being transferred to CS departments in their interactions with industry. Several recent mainstream news articles have documented on-campus student protests criticizing various actions by tech companies, both in how their products are used and in how companies have responded to internal missteps. In some cases, these protests also target CS departments and faculty members involved in partnering with or hosting these companies. Adding fuel to fire, the current rapid growth and adoption of AI technologies threatens to further amplify this backlash. While our community has always benefited from members who have advocated for increased social responsibility in computing, a broader response is needed to address the growing techlash on campus and in society. In this interactive session, we will place techlash in context, and discuss what actions CS departments and tech companies can take to rebuild a positive image for tech in academia and industry. Much of the discussion will be driven by audience questions, so audience participation will be highly welcomed!

**Track 4: Addressing the Challenge of Mis- and Disinformation, Online and Beyond**

Chair/Moderator: Kate Starbird (University of Washington)

Speakers: Amy Zhang (University of Washington), Laura Edelson (NYU) and Yasmin Green (Jigsaw)

Mis- and disinformation are a critical challenge for democratic societies. Acute misinformation can lead to poor decision making, for example about whether or not to take a vaccine. At scale, it can render a society unable to effectively respond to collective crises, from pandemics to climate change. Pervasive disinformation (intentionally misleading information) erodes trust in institutions, including science, journalism, government, and democracy — and can make it difficult for citizens of democratic societies to come together to do the difficult work of governing themselves. In recent years, we seem to be experiencing an acceleration and expansion of mis- and disinformation, with many pointing to the role of the Internet and social media in particular in their spread. As we continue to come to terms with the scale and nature of the issue, the work of identifying potential "solutions" looms. It's clear that there is no one, simple solution — but there is hope that we can mitigate its damage by productively chipping away at the problem from multiple angles. This conversation explores the some of the proposed solutions to the challenge of mis- and disinformation, addressing them along several distinct dimensions — e.g. from education, to policy, to platform (re)design.

3:00 – 3:30 pm **Break**

3:30 – 5:00 pm **Making a Federal Case for Computing**

Speaker: Peter Harsha (CRA)

Peter Harsha is the Director of Government Affairs for the Computing Research Association. In his position, Peter works to help CRA influence computing research policy by improving public and policymaker understanding of the nature of research, and by increasing the computing community's awareness of and participation in policy issues. Prior to joining CRA in October 2001, Peter spent six years working for Congress, beginning as a member of the personal staff of Congressman Nick Smith of Michigan. In the 106th and 107th Congresses, Peter served as a member of the professional staff of the House Science Committee as Chairman Smith's designee on the Subcommittee on Research, working on a portfolio of issues that included oversight of the National Science Foundation, Information Technology, the U.S. Fire Administration, and the National Earthquake Hazards Reduction Program. Peter has three boys, and a cat named for 80's hockey goon Marty McSorley.

5:00 – 6:30 pm **Break**

6:30 pm **Dinner**

## 2022 Conference at Snowbird Organizing Committee:

- Penny Rheingans (University of Maine) Co-Chair
- Shashi Shekhar (University of Minnesota) Co-Chair
- Jaime Teevan (Microsoft) Co-Chair
- James Allan (University of Massachusetts, Amherst)
- Christine Alvarado (University of California, San Diego)
- Carla Brodley (Northeastern University)
- Peter Harsha (CRA)
- Kate Larson (University of Waterloo)
- Ran Libeskind-Hadas (Claremont McKenna College))
- Divesh Srivastava (AT&T)

# AAAS Annual Meeting 2022 – Robotics: Empowering not Replacing People

CCC
Computing Community Consortium
Catalyst

*By Maddy Hunter, CCC Program Associate*

As further advancements in Artificial Intelligence are made, automated processes and robotics are becoming a ubiquitous entity in the workforce. As a result, there is a growing concern among the public that robots will replace humans and cause a massive job shortage. The Computing Community Consortium (CCC) organized the "Robotics: Empowering not Replacing People" scientific session at the 2022 American Association for the Advancement of Science (AAAS) Annual Meeting in February to address this concern in the public perception.

The panel moderated by CCC Council Member, Maria Gini (University of Minnesota, Twin Cities) and featuring Henrik Christensen (University of California, San Diego), Michelle Johnson (University of Pennsylvania) and Julie Shah (Massachusetts Institute of Technology) refuted the claim that robots would decrease job openings and stated the concern is based off of a misconception on the actual capabilities of an AI and their position in the workforce. The speakers explored why robots are so important to the economy, new fields where implementing robotics would be beneficial, and refuted the public perception that AI in the workforce will put people out of jobs, but instead create new jobs.

As the event was fully virtual, the session consisted of three "spotlight" videos that registrants could watch beforehand, each featuring a presentation from one of the speakers outlining their current research and opinions on the matter.

Henrik Christensen's presentation, "Empowering People Using Robot Technology" took a two prong approach to the issue, first outlining why we need robots and the second showing why that is not a bad thing. Christensen started off by pointing out the growing need for robotics in the workforce due to individualization of products, the growing dependency ratio, urbanization and COVID. The graph (Figure 1) below compares the dependency ratio (a comparison of those retired and above age 65 in comparison to members of the workforce). As you can see in the US there are more than two people of "dependency" for every one person in the workforce. Christensen recounted the fact that the life span of a human being goes up by 8 hours every day. As a result, there are

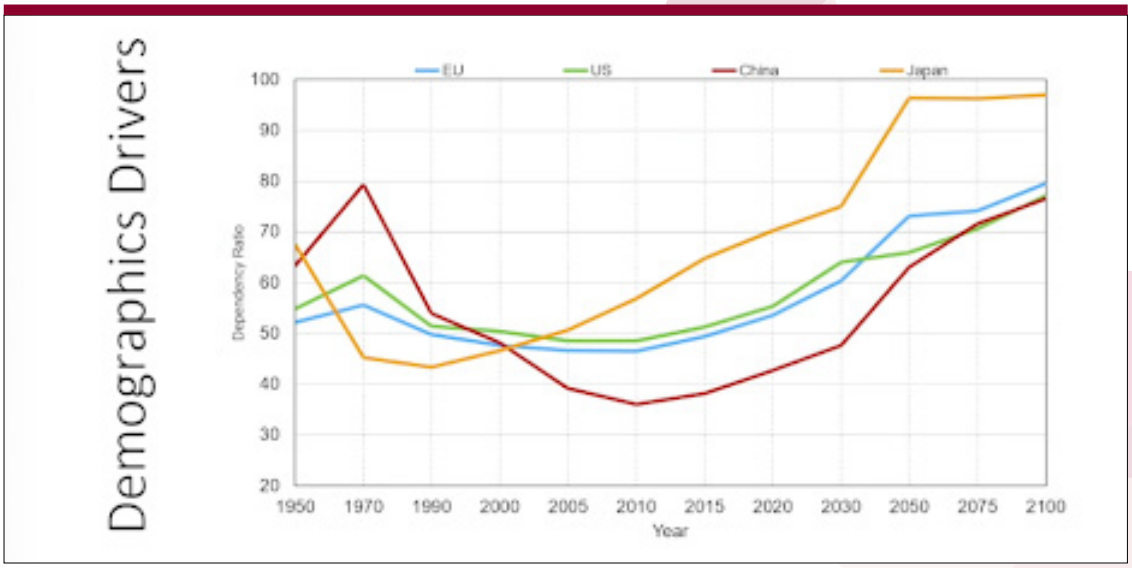



***Figure 1 Demographics Drivers Graph***

# Robotics *(continued)*

more people than ever that need assistance in everyday life and there are not enough workers to satiate the demand. Technology such as a robot that brings meals to someone with low mobility, or dispenses pills or aids those with memory impairments will help people "age in place" enabling them to stay at home and live independently for longer periods of time. Christensen urges that technology makes it possible to empower people from cradle to grave.

Continuing with the theme of robots not replacing jobs, but being used to bridge a gap in the workforce Michelle Johnson spoke of the use of robots in physical therapy and rehabilitation settings in her presentation, "**Rehabilitation can Help Bridge Gaps in Stroke and Rehabilitation Care**". Johnson stated she gets the question almost daily, whether or not therapy and rehabilitation robots will replace current physical therapists. She assures in the same sense as Christensen, that these robots will not be used to replace but instead assist and complement current therapy roles. As with the aging population, strokes are becoming more and more common, as is the survival rate. There are not enough rehabilitation workers to compensate for the demand and robots can help in repetitive tasks and objective testing to bridge the gap. Johnson gave the example of high repetition, and high intensity work such as moving a limb a thousand times to try and restart muscle memory in a patient. Tiring and time-consuming a therapist cannot do that with a patient that many times repetitively, whereas a robot will not tire and additionally, will be able to objectively detect progress.

This leads us to the question of how robots can truly become a partner to the workforce and are able to do a broader range of tasks in more complex environments versus the stagnant, single-objective tasks that most do now. Julie Shah addresses this question and dives deeper into the roadblocks preventing this from being a reality in her presentation "**Intelligent Machine Teammates**".

Shah starts off by emphasizing the limited ability we have to safely and properly integrate artificial intelligence into society without first teaching robots to successfully model humans.

She gave the example of Roombas, artificially intelligent vacuums, viewing homeowners the same as a couch or table leg resulting in a lot of bruised ankles from being hit. At the moment, robots view humans as inanimate obstacles, they need an effective model of us before they can learn to model tasks and collaborate in the workplace. Shah included a video in her presentation on current research that used a robot to help set a kitchen table. The robot observed a person setting the table and used that model to recreate the process. The goal is to enable training a robot through a feedback loop of direct training from the domain expert and transparent behavior from the robot on what it has learned. If the robots are taught higher level specifications of the delineation between what is acceptable and what is not acceptable they will be more flexible and able to adapt to disturbances.

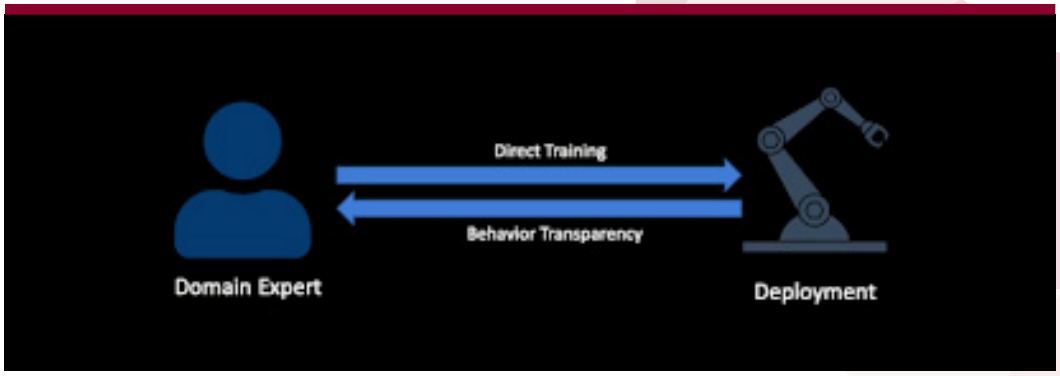



***Figure 2***

# Robotics *(continued)*

Moderator Maria Gini opened up the Q&A asking the panelists what impact COVID-19 has had on robotics.

All panelists named a number of areas within robotics that required immediate growth and research due to the pandemic, such as technologies to support medical staff shortage, decrease the risk of infection within hospitals and contact tracing. Tying back to using robotics to not replace people but bridge the gap of physical therapy needs and a growing aging population, Johnson said "COVID showed us what happens when supply and demand don't match up. We think that it is so far away but it can happen in an instant." The world saw those devastating effects with overrun hospitals and an understaffed medical field.

Gini asked further questions about robots replacing doctors, whether technology regulations were holding back technological innovation and how to educate the population on what robots can actually do. Overall, the remaining theme was that robots are nowhere near possessing the capabilities to replace humans in the workforce but are instead needed to bridge the growing gap in the needs of the population and act as a complimentary entity in the workforce to make our lives easier. As you can see in Figure 3 (Robots & Jobs) the manufacturing employment rate and robot sales in the US are growing together. Robots will not take over factories – in fact, most autonomous factories there's one robot per five people.

This AAAS panel was featured in The Economist "Covid has reset relations between people and robots". The article dove into the claim that automation is likely to accelerate citing two main reasons: that robots are getting better and "The Great Resignation" a nickname capturing the mass movement of US citizens quitting their jobs due to the pandemic. The article went on to address the likely uptick in automation has quite a few people worried that robots will outnumber and replace humans in the workforce and used the AAAS panel session and statements from the three panelist experts to combat the concern.

You can view all CCC AAAS sessions here.

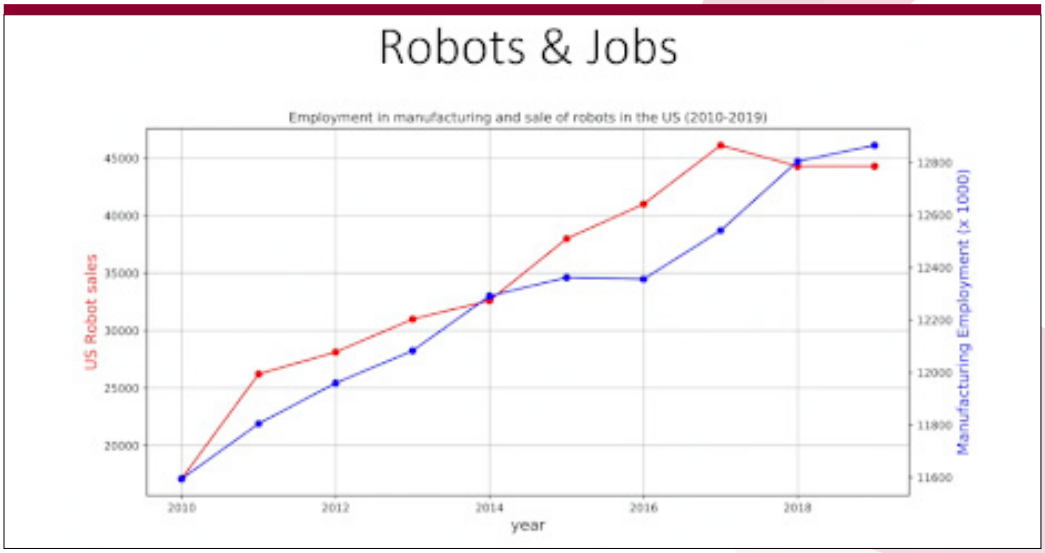



***Figure 3 Robots vs Jobs Chart***

# OLPA Distinguished Lecture: Reflection and Vision: Women in Computing Share insights on STEM

CCC
Computing Community Consortium
Catalyst

*By Maddy Hunter, CCC Program Associate*

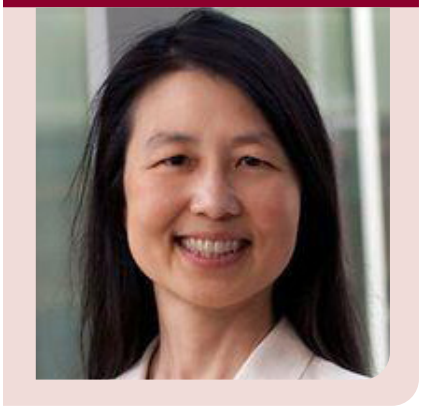
In honor of Women's History Month, the National Science Foundation's Office of Legislative and Public Affairs (NSF OLPA) put together a Distinguished Lecture entitled **"Reflection and Vision: Women in Computing Share Insights on STEM"**. Moderated by current NSF Computer and Information Science and Engineering (CISE) Assistant Director, Margaret Martonosi, the lecture featured two past NSF CISE ADs Ruzena Bajcsy, and Jeannette Wing.

## Ruzena Bajcsy

Dr. Bajcsy was "one of the first women" in many regards in the STEM field. She received her M.S. and first Ph.D. in Electrical Engineering at the Slovak Technical University in Bratislava, Slovak Republic and in 1972 she graduated with a Ph.D. in Computer Science from Stanford University. After graduation, she worked as a Professor at the University of Pennsylvania, where in 1978, she established the General Robotics, Automation, Sensing, and Perception (GRASP) Lab, which fostered interdisciplinary research activities from electrical and mechanical engineering to psychology/cognitive science. She served as the NSF CISE AD from 1998-2001.

Currently, she is the NEC Distinguished Professor of Electrical Engineering and Computer Sciences at the University of California, Berkeley where she founded the Center for Information Technology Research in the Interest of Society (CITRIS), a multicampus organization. She also played a founding role in establishing a program of Digital Humanities.

*"My message to the younger generation is we all live in the same community, we strive or die with the community. I always felt it was our responsibility once we got to a certain level to help grow and flourish the community. I had a specific agenda to help."* – Ruzena Bajcsy



## Jeannette Wing

Dr. Wing's career combined stints in academia and industry. After receiving her bachelor's, master's, and doctoral degrees from MIT, Wing served as Head of the Department of Computer Science and as Associate Dean for Academic Affairs of the School of Computer Science at Carnegie Mellon University. During a leave of absence, she acted as the NSF CISE AD from 2007-2010. After Carnegie Mellon University she went to Microsoft where she served as Corporate Vice President of Microsoft Research, overseeing research labs worldwide. Wing now is Executive Vice President for Research and Professor of Computer Science at Columbia University.

*"My dad said engineering is using math to solve real world problems and after that answer I said I want to study engineering that did it for me and that basically set me on my career for life."* – Jeannette Wing

# OLPA Distinguished Lecture *(continued)*

## Margaret Martonosi

Dr. Martonosi currently serves as the AD for NSF CISE. After receiving her bachelor's and master's degrees in Electrical Engineering from Cornell University she graduated in 1993 with a Ph.D. from Stanford University. After graduating, she went to Princeton University where she is now the H.T. Adams '35 Professor of Computer Science. Her work with others to co-found the ACM CARES movement, received the Computing Research Association's Distinguished Service Award.

*"When I talk early career scientists that's, that is the most fun thing I do because they have this incredible energy and vision that they bring to their work."*
– Margaret Martonosi

Although their stories and career paths are very different, each woman played a transformative role in NSF and the STEM field as a whole. The lecture explores what sparked their interest in STEM (particularly in computer science and engineering), how the field and their engagement with the field has evolved over time and key transformative moments that transformed or defined their career path.

You can watch the full lecture here.

# NITRD 30th Anniversary Symposium

CCC
Computing Community Consortium
Catalyst

*By Maddy Hunter, CCC Program Associate*


The Networking and Information Technology Research and Development (NITRD) Program is the Nation's primary source of federally funded work on pioneering information technologies (IT) in computing, networking, and software. On December 9th, 2021 the 30th Anniversary of the NITRD program occurred during the height of the pandemic, and accordingly a virtual commemoration was held on December 2nd, 2021 to celebrate the incredible achievements of the last 30 years while maintaining social distancing measures. While the anniversary has passed we will be hosting an in-person event on May 25th, 2022 in Washington, D.C. to commemorate this milestone.

The event, organized by the National Coordination Office for NITRD, with support from Computing Research Association's Computing Community Consortium (CCC), will highlight the impact on society of the coordinated federal investment in networking and information technology research and development over the past 30 years.

Achievements in networking and information technology have created the thriving technology innovation ecosystem that exists in the United States today. By fostering the advances in this field, the Federal Government has played an essential role. The Federal investment in Networking and Information Technology (NIT) Research and Development (R&D) dates from the birth of the field more than 70 years ago. In 1991, the High Performance Computing Act recognized the unique importance of NIT R&D to our nation, and provided for multi-agency coordination of this investment. NITRD was created by the High Performance Computing Act of 1991 and is formerly known as High Performance Computing and Communications (HPCC) Program.

The commemoration will be live streamed. If you would like to watch please register here and we will send you the live link the morning of May 25th. The event starts at 9 AM ET. For more information, please see the NITRD website.

# Thank you, Data Buddies! (Fall 2021)

CERP
Computing Research Association
Evaluation

*By CERP Staff*

CRA and CERP wish to thank the institutions and departments that distributed the 2021 annual Data Buddies Survey! A total of **145 institutions** worked with CERP for the 2021 survey year, with 48 departments receiving "elite" status by obtaining a response rate of 20% or more.

The collective efforts of Data Buddies institutions enable CERP to provide resources to the computing community through research and evaluation focused on students' experiences in computing degree programs. For example, CERP publishes monthly infographics and conducts research using Data Buddies data.

Is your institution listed below? If not, help the computing community by becoming a Data Buddy today! Joining is free and easy, and your department will receive a report every year you participate in the project. Check out our sample report here!

Click here to learn more about Data Buddies and click here to sign up!

## Special thanks to the **48 Elite Data Buddies** who had at least a 20% response rate from their students!

Alma College
Boston University (Bioinformatics)
Clark University
CodeCrew Code School
Colgate University*
Connecticut College
Davidson College
DePauw University
Duke University*
Gallaudet University
Georgia Gwinnett College
Green River College
Harvey Mudd College*
Illinois Wesleyan University
Kean University*
Landmark College
Lehigh University*
Loyola University Chicago*
Loyola University-Maryland
Michigan State University*
Middlebury College
Mount Holyoke College*
Northern Kentucky University*
Pomona College*
Saint Mary's College of Maryland
Simmons University*
Southern Connecticut State University
Southwestern University
Stony Brook University*
Swarthmore College*
Temple University*
University of Hawaii-Hilo
University of Massachusetts-Amherst*
University of Minnesota-Twin Cities
University of North Carolina-Charlotte (Bioinformatics)
University of North Carolina-Charlotte (CS)*
University of North Carolina-Charlotte (SIS)
University of Pittsburgh (CS)*
University of Pittsburgh (INS)*
University of Puget Sound*
University of Texas-Austin (ECE)
University of Wisconsin-Milwaukee*
Washington and Lee University
Washington University-St Louis*
Westminster College-Salt Lake City
Winston Salem State University
Worcester State University
Yale University*

# Data Buddies *(continued)*

## And a big thank you to the rest of the **actively engaged Data Buddies** who contributed to the project this year!

Allegheny College
Arizona State University*
Auburn University*
Baldwin Wallace University
Barnard College*
Boise State University
Boston University (CS)*
Brown University*
Calvin University
Carleton College*
Carnegie Mellon University*
Case Western Reserve University*
Clovis Community College
Colorado School of Mines*
Colorado State University*
Columbia University*
Cornell University*
DePaul University*
Drexel University
Eastern Washington University
Farmingdale State College
Florida International University*
George Mason University*
Georgia Institute of Technology*
Grinnell College*
Harvard University*
Johns Hopkins University*
Kansas State University*
Miami University-Oxford*
Montana State University*
Morehouse College
New Mexico State University-Main Campus*
New York University*
Northeastern University*
Ohio University*
Oklahoma State University-Main Campus*
Pacific Lutheran University
Princeton University*
Rensselaer Polytechnic Institute
SUNY College-Plattsburgh
Tennessee Technological University*
Texas A&M University*
Texas State University*
The Ohio State University*
Tufts University*
Union College*
University of Alabama*
University of Alabama at Birmingham*
University of British Columbia*
University of California-Davis*
University of California-Riverside*
University of California-San Diego*
University of California-Santa Barbara*
University of Chicago*
University of Cincinnati*
University of Colorado-Boulder*
University of Hawaii at Manoa
University of Houston*
University of Illinois-Chicago (CS)*
University of Illinois-Chicago (ECE)
University of Illinois-Springfield
University of Illinois-Urbana Champaign (CS)*
University of Illinois-Urbana Champaign (ECE)*
University of Iowa
University of Maine*
University of Maryland-Baltimore County*
University of Maryland-College Park (CS)*
University of Maryland-College Park (iSchool)
University of Michigan-Ann Arbor*
University of Nebraska-Kearney
University of Nebraska-Lincoln*
University of Nevada-Reno*
University of New Mexico-Main Campus*
University of Notre Dame*
University of Oregon*
University of Pennsylvania*
University of Rochester*
University of San Diego
University of San Francisco
University of South Florida-Main Campus*
University of Southern Mississippi*
University of Texas-Austin (CS)*
University of Texas-Dallas*
University of Texas-El Paso*
University of Texas-San Antonio
University of Toronto*

## Data Buddies *(continued)*

University of Utah*
University of Virginia*
University of Washington*
University of Wisconsin-Madison*
Virginia Tech*
Wayne State University*
Wellesley College
Western Washington University
Whitman College*
Winthrop University
Worcester Polytechnic Institute*

* Indicates CRA member departments. In cases where a CRA member department is embedded in a larger college, the college was marked as a member.

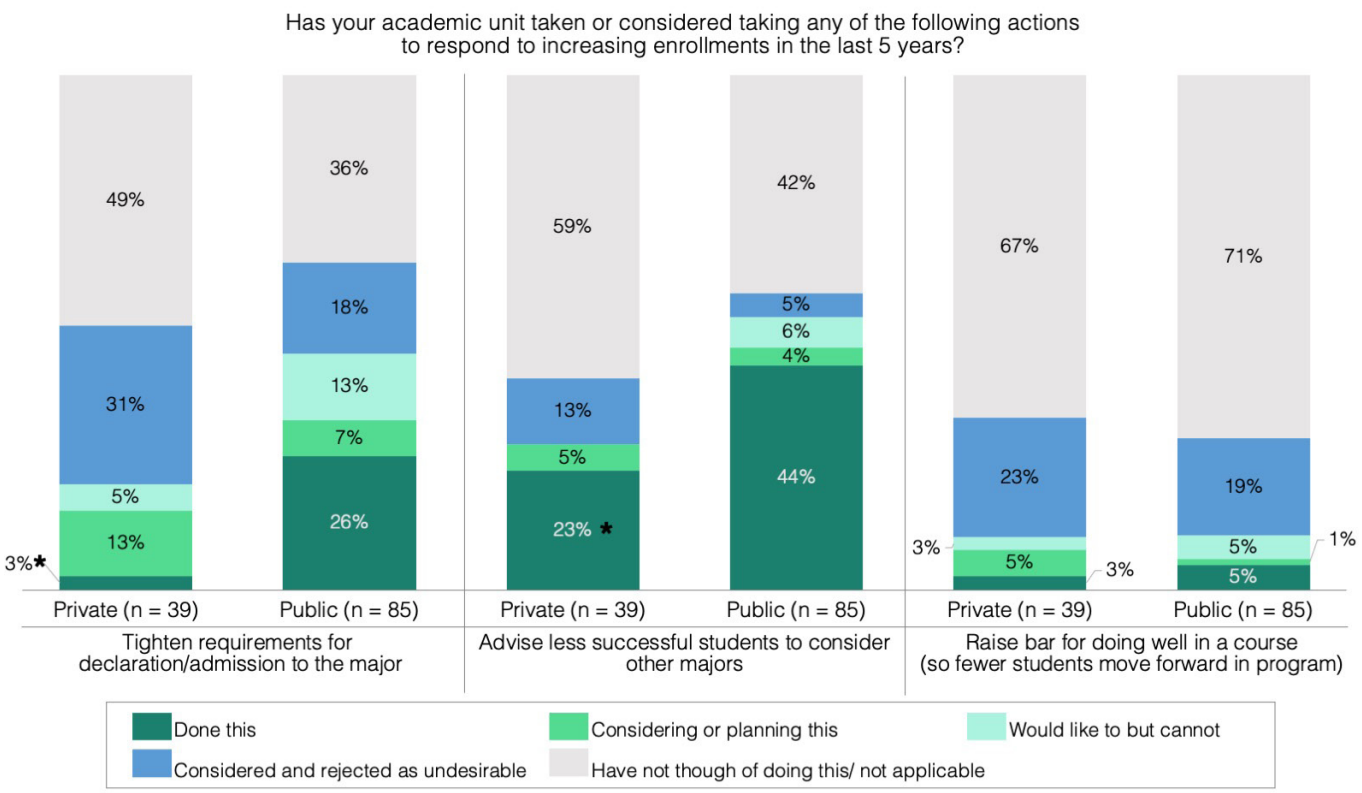
This message is brought to you by the CRA's Center for Evaluating the Research Pipeline (CERP). CERP provides social science research and comparative evaluation for the computing community. Subscribe to the CERP newsletter here.

The Data Buddies Project is currently supported through National Science Foundation (NSF) awards CNS-1840724, CNS-2036717, DUE-1821136, sub-awards and contracts, and direct CRA contributions. Previous NSF awards that supported the project include CNS-1246649 and DUE-1431112. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

# Responses of Academic Units in Public and Private Institutions to Increasing Enrollments in Computing

CERP
Computing Research Association
Evaluation

*By Burçin Tamer, Director of CERP*




Source: CRA Policies and Data Practices Survey. 2021. Center for Evaluating the Research Pipeline, Computing Research Association. * indicates a statistically significant difference between private and public academic units.

The graphic presented here summarizes data about departmental practices to respond to increasing enrollments in computing broken down by private and public higher education institutions. These data are taken from the new Policies and Data Practices Survey that CRA's Center for Evaluating the Research Pipeline (CERP) launched in 2021 to collect data from computing departments about the policies and data practices related to issues relevant for broadening participation in computing (BPC).

The findings indicate that there were some differences in the type of actions taken by private and public higher education institutions in the survey sample. Specifically, academic units in private institutions were significantly less likely to tighten their admission/enrollment requirements and to advise less successful students to consider other majors compared to those in public institutions.

It is also worth noting that among the three practices asked about in the survey, most institutions did not consider or find applicable the option of raising the bar for doing well in a course to reduce the number of students moving forward in their program.

Departmental policies and practices for regulating enrollment in their majors can have significant consequences for which students are able to earn a degree in computing. Certain practices may systematically discriminate against students from various demographic, socio-economic, or academic backgrounds. For instance, requiring prior experience in computing for admission to the

# Increasing Enrollment *(continued)*

major is likely to alienate students from disadvantaged socio-economic backgrounds as they may not have had access to AP courses or other training prior to entering college. Ultimately, policies and practices that result in systematically uneven treatment of certain groups of students over others can perpetuate the lack of diversity in the field of computing.

**Notes:**

- The Policies and Data Practices survey was sent to all academic units that participate in the Taulbee Survey and/or the Data Buddies Project. A total of 128 academic units (42 private, 86 public) responded to the survey.
- The question used in this analysis was: "Some institutions have reported taking some of the actions listed below in response to increasing enrollment. Has your academic unit taken or considered taking any of the following actions in the last 5 years?".
- The following actions were listed as part of the question: Tighten requirements for declaration/admission to the major, Advise less successful students to consider other majors, Raise bar for doing well in a course (so fewer students move forward in program).
- The response options for this question were: Done this; Considering this or Planning this: Considered and rejected as undesirable; Would like to, but cannot: Haven't thought of doing this; Not Applicable. For the purposes of this analysis the last two options were combined.

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This analysis is brought to you by the CRA's Center for Evaluating the Research Pipeline (CERP). CERP provides social science research and comparative evaluation for the computing community. Subscribe to the CERP newsletter here. Check out CERP's activities and find out how to engage on CERP's website.

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# Expanding the Pipeline: The Context, Importance, and Experience of Writing Departmental BPC Plans

*By Dorian Arnold, Manuel Pérez Quiñones, Michelle Rogers, Burçin Tamer*

Broadening participation should be one of the higher priorities in all Computing programs in the US. Efforts to increase participation from minoritized communities has been going on in earnest for over a decade. Unfortunately, we have yet to expand the group of faculty and staff engaged in these activities and have only made a marginal difference in who is studying computing. In this article we will focus on BPC Plans as an attempt to supplement and scale-up the computing community's efforts to address the issue of lack of diversity in computing.

In this article we will describe what BPC Plans are; outline the background/context of the BPC Plan initiative; identify why BPC Plans are important; provide an overview of BPC Plan development from the perspective of a department that has developed a verified Departmental BPC Plan, Emory University Department of Computer Science; and conclude with some pointers to available resources for getting started with you Departmental BPC BPC Plan.

## The NSF CISE BPC Plan initiative

In July of 2018, the NSF Directorate for Computer and Information Science and Engineering (CISE) began a pilot initiative to include Broadening Participation in Computing (BPC) efforts as an accepted and expected part of medium and large CISE research award portfolios. At its core, this initiative seeks to help the field of computing make full use of the talents of our diverse nation by scaling up broadening participation efforts and to engage a larger portion of the computing community in these efforts.

This initiative required proposals submitted to certain CISE programs to have an approved BPC Plan (Project BPC Plan) at the time of award. The Project BPC Plans describe actions that each of the PIs in a project will take to contribute to BPC. These do not need to be integrated into the technical part of the proposal and are not expected to be novel. The PIs are encouraged to benefit from existing BPC efforts and, when possible, connect with organizations that are already engaged in these efforts. Currently, Project BPC Plans are required to be included as supplemental materials for each proposal submitted to the relevant programs in the CISE Directorate.

An evolution of the BPC Plan initiative included the introduction of Departmental BPC Plans to offer a range of institutional programs and activities that can be used by faculty to develop their Project Plans. Departmental plans are developed at the departmental level and submitted to BPCnet.org, a resource clearinghouse funded by the NSF. The Departmental Plans include BPC related activities that a department is already implementing in or plans to implement in. Faculty can identify activities within their department to engage with and describe how they will do that in their Project BPC Plan.

At a higher level, the Departmental BPC Plans demonstrate to the community a deep and ongoing commitment to equity and inclusion. The practical benefit of developing a Departmental Plan is that it provides a resource for the faculty to create meaningful Project BPC Plans. Creating these Project Plans will then potentially expand the number of faculty engaging in broadening participation in a meaningful way. Further, Departmental BPC Plans can also serve as models for other institutions to create their own plans.

A range of resources were developed leveraging the existing BPC efforts and expertise, and with support from the NSF in order to assist departments and faculty writing BPC Plans. In doing so, these resources support the community's efforts to broaden participation in computing. BPCnet.org was created in 2019 as a clearinghouse for resources on BPC. The same year, a workshop on Departmental BPC Plans was held at the University of Illinois, Urbana-Champaign. In 2020, an additional Workshop Series project started with three virtual workshops organized by CRA and will continue with another in-person workshop on August 4-5th, 2022. BPCnet.org also provides a BPC Consultancy service which is made

# Expanding the Pipeline *(continued)*

available to the computing faculty to have one-on-one consultations with BPC experts at no cost thanks to funding from the NSF.

BPCnet RESOURCE PORTAL

## Why is it important to have a Departmental BPC Plan?

The NSF effort to encourage the development of Departmental Plans seeks to help departments state their goals, actions and assessment metrics in a structured way, to address their BPC priorities. The effort does so by providing support, in the form of templates, examples, and consultants, so that departments are not in a void considering "how do I tackle this challenge?" Having a plan, in addition, can help sustain the effort by considering activities beyond the "one and done" that often plague broadening participation efforts. Activities organized and planned at the department level can be strategically selected and coordinated thus increasing the chances of success to reach out and encourage participation from the marginalized communities currently not engaging in computing.

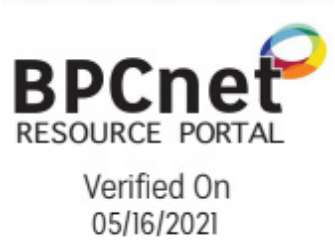
Furthermore, having a plan makes it easy for faculty, researchers, and staff to decide how to engage in BPC efforts. In our experience, most people want to help, but not all are comfortable or knowledgeable about how to engage. Many are worried they will do more harm than good by working with populations they are not familiar with. Having a series of activities, organized, planned, and vetted in a departmental plan serves as a "menu of options" from which personnel (faculty and staff) can select a level of participation with which they are comfortable. This, presumably, will increase engagement at the departmental level and will expand the number of people working on BPC. This will remove the burden from those minortized faculty members doing all of the service work for BPC.

Overall, it is essential to have a solid BPC Departmental plan as a guiding, and living, document for how to expand the reach of computing to those communities that have traditionally been excluded.

## What does it take to write a Departmental BPC Plan?

The faculty at the Emory University Department of Computer Science, probably not unlike many or most others, comprised a handful (or fewer) of individuals with significant experiences with BPC activities. However, the majority among all the faculty in the department were interested in BPC and likely to engage or participate if there were ongoing BPC initiatives that could be leveraged. A Departmental BPC Plan was an excellent instrument to organize and enhance existing BPC efforts as well as bootstrap new ones. The faculty members who were already involved in broadening participation also viewed a Departmental BPC Plan as an instrument that could motivate and facilitate broader participation among the faculty in appropriate efforts.

Three members of the CS department at Emory University attended the 2019




Departmental BPC Plan Workshop at the University of Illinois, Urbana-Champaign. This workshop was instrumental in the development of the CS Department's BPC Plan. Pre-workshop activities pushed participants to research and become very familiar with the BPC-related activities in their department, college or school and the university at large. It can be worthwhile to even be familiar with regional activities, for example, at other schools in the city or state.

It is also important that the attending participants are empowered to make critical decisions around the Departmental Plan. For these reasons, the workshop required a department chair (or similar) be a part of the team. However, other faculty can be similarly empowered by a priori department buy-in and endorsement. Most attending departments left the workshop with a complete or near complete draft of a full Departmental BPC plan. After the workshop, BPCnet.org consultants helped refine the CS Department's initial draft into a final Departmental BPC Plan which was then verified by BPCnet.org.

The obvious benefit of having a Departmental BPC Plan is that it facilitates the development of Project BPC Plans. Additionally, a Departmental BPC Plan helps faculty members to learn about new BPC-relevant campus activities and organizations that they are incorporating

# Expanding the Pipeline *(continued)*

into their BPC practices as well as pursuing new BPC collaborations.

## Getting started with your Departmental BPC Plan

While writing a BPC Plan might seem like a daunting task, with all the resources and support currently available, the process is fairly streamlined and simply requires some commitment from the departments. As evident by the Emory University CS Department's experience, developing a Departmental BPC Plan begins with some pre-work of gathering information and identifying the goals and activities appropriate for your department. Reviewing resources on BPCnet.org, attending BPC Plan writing workshops, and connecting with a BPC Consultant can help facilitate this process. Putting your Plan in writing is also made simple using templates and checklists available on BPCnet.org. BPC Consultants are available throughout this process to review drafts and have virtual consultations with you to help you navigate the writing process with ease. Once you have a complete draft of your Departmental BPC Plan, BPCnet.org BPC Consultants will review and verify your Plan, which will indicate that your Plan meets the criteria for a meaningful Departmental BPC Plan and enable faculty in your department to submit it with their Project BPC Plans when applicable. Verified Departmental BPC Plans are published on BPCnet.org to serve as examples for other departments and demonstrate each department's commitment to broaden participation in computing.

Finally, it is important to note that implementation of BPC Plans (both Departmental and Project) is critical to the success of this initiative. Development of BPC Plans no doubt creates awareness of BPC among the faculty when they are involved in the process or are aware of their department's BPC Plan. However, the real contribution to BPC occurs when both departments and faculty commit to implementing the activities outlined in their BPC Plans. This is incentivized by a requirement to revise Departmental BPC Plans every two years and reporting of progress in Project BPC Plans in annual reports to NSF.

## Selected resources on BPCnet.org

- Overview of BPC Plans: Review of the types of BPC Plans and links to relevant pages on BPCnet.org
- Departmental Plans: More details on Departmental BPC Plans including checklists and templates
- Project BPC Plans: More details on Project BPC Plans
- Connected Project BPC Plans and Standalone Project BPC Plans: Checklists and templates
- BPC Plan Consultancy: Scheduling to connect with a BPC expert for support in writing your Departmental and Project BPC Plan
- BPCnet.org Statistics and Data Hub: Statistics and data tailored to the computing community's needs for easy access
- Customizing your BPC Plan: Curated resources on various topics to help you create a meaningful BPC Plan that can rely on evidence based knowledge and expertise on BPC.
- BPCnet.org FAQ: Frequently asked questions about BPC Plans including references to the official NSF FAQ
- BPC Plan submission form: Submit your Departmental BPC Plan for verification by BPCnet.org
- News and events: Announcements of future BPCnet.org events and resources from past events
- BPC Community Calendar: Events and deadlines from the BPC community
- BPCnet Bulletin: BPCnet.org blog
- BPCnet.org mailing list: Sign-up for important announcements and a monthly overview of BPC related content.

## About the authors

**Dorian Arnold**

Dorian Arnold is a tenured, associate professor of Computer Science at Emory University. His technical interests are in large scale distributed systems, fault-tolerance and software tools for high-performance computing environments.

# Expanding the Pipeline *(continued)*

Some highlights of his many BPC-related efforts include serving as General Chair of the 2017 Richard Tapia Celebration of Diversity in Computing and chairing the 2017 Pipeline Workshop in Diversity in HPC.

**Manuel A. Pérez-Quiñones**

Manuel A. Pérez-Quiñones is a Professor of Software and Information Systems at the University of North Carolina at Charlotte. He is an ACM Distinguished Member and for his efforts to diversify computing has been recognized with the 2017 Richard A. Tapia award, and the 2018 CRA Nico A. Habermann award.

**Michelle L. Rogers**

Michelle L. Rogers is a Program Officer at the National Science Foundation in the Computing and Networking Systems (CNS) Division of the Directorate for Computer and Information Science and Engineering (CISE). There, she is working on broadening participation efforts with the Education and Workforce (EWF) working group. In addition, she is an Associate Professor in the College of Computing and Informatics at Drexel University.

**Burçin Tamer**

Burçin Tamer is the Director of the Center for Evaluating the Research Pipeline (CERP) at the Computing Research Association (CRA). She leads a number of projects that collect data, conduct research and evaluation, and engage with the computing community to support the community's efforts to broaden participation in computing.

# CRA Board Member Carla Brodley Receives the 2021 ACM Frances E. Allen Award for Outstanding Mentoring

CRA
Computing Research Association

ACM recently named Carla E. Brodley as the recipient of the inaugural ACM Frances E. Allen Award for Outstanding Mentoring. She is recognized for significant personal mentorship and leadership in creating systemic programs that have increased diversity in computer science by creating mentoring opportunities for thousands at Northeastern and other universities across the United States. Brodley is a member of the CRA Board and former member of the CRA-WP Board.

From the ACM Announcement:

> An internationally recognized leader in the fields of machine learning, data mining, and artificial intelligence, Brodley has shown a deep commitment to mentoring and increasing diversity in computer science throughout her academic career. She has worked to develop and disseminate data-driven mentoring practices to make computer science more diverse, inclusive, and equitable in a sustainable and systemic way.
>
> Carla E. Brodley is Dean of Inclusive Computing, and past Dean of the Khoury College of Computer Sciences at Northeastern University.
>
> "Computing is so essential to the way we live now and will live in the future," said ACM President Gabriele Kotsis. "At ACM, we believe it is a matter of utmost importance to ensure that all people, regardless of their gender or racial background, learn about the possibilities of pursuing a career in computer science and feel welcome in our field. Carla E. Brodley not only put effective strategies into practice at Northeastern University, but she has developed a program to help dozens of computer science departments around the US effectively diagnose their diversity challenges and systemically address them. Thousands of students have benefited from her work, and we encourage everyone who is interested in broadening participation in academia or the private sector to learn from her example."
>
> Inaugurated this year, the ACM Frances E. Allen Award for Outstanding Mentoring will be presented biennially to an individual who has exemplified excellence and/or innovation in mentoring with particular attention to recognition of individuals who have shown outstanding leadership in promoting diversity, equity, and inclusion in computing. The award is named for Frances E. Allen, an American computer scientist and pioneer in optimizing compilers. Allen, who was the first woman to receive the ACM A.M. Turing Award, was especially known for her mentorship of younger colleagues. The award is accompanied by a prize of $25,000 to the awardee, and an additional $10,000 cash contribution to an approved charity of the awardee's choice. Financial support is provided by Microsoft Research.

Congratulations Carla! Click here for the full announcement.

# CRA-WP Featured in the 2022 STEM for All Video Showcase: Access, Inclusion, and Equity

CRA-WP
Computing Research Association
Widening Participation

A short video from CRA's Committee on Widening Participation in Computing Research (CRA-WP) is featured in the 2022 STEM for All Video Showcase May 10-17. CRA-WP's video is entitled "Broadening Participation in Computing Research with CRA-WP" and highlights programs funded through National Science Foundation award #1840724. CRA-WP is a Broadening Participation in Computing Alliance that focuses on community building, career mentoring, information sharing, and effecting systemic change for undergraduate and graduate students, post-doctoral researchers, faculty, and industry and government researchers.


The theme for this year's STEM for all Video Showcase is "Access, Inclusion, and Equity." Video presentations address broadening participation; STEM learning in formal, informal, community and home settings; design and implementation of STEM and CS programs; research informing STEM and CS teaching and learning; and measuring impact of innovative programs. Collectively, the presentations cover a broad range of topics including science, mathematics, computer science, engineering, cyberlearning, citizen science, maker spaces, broadening participation, research experiences, mentoring, professional development, NGSS and the Common Core.

Now in its eighth year, the annual showcase features over 250 innovative projects aimed at improving Science, Technology, Math, Engineering and CS education, which have been funded by the National Science Foundation and other federal agencies. During the 8-day event, researchers, practitioners, policy makers and members of the public are invited to view the short videos, discuss them with the presenters online, and vote for their favorites.

Last year's STEM for All Video Showcase is still being accessed, and to date has had over 103,000 unique visitors from 178 countries.

Additional videos in the showcase are also focused on computing. A few highlights are:

- The Alliance for Identity-Inclusive Computing Education https://stemforall2022.videohall.com/presentations/2439
- Computing Alliance of Hispanic-Serving Institutions https://stemforall2022.videohall.com/presentations/2617
- Equal Access: Making STEM More Inclusive of Faculty with Disabilities https://stemforall2022.videohall.com/presentations/2437
- Supporting Computer Science Student Mental Health https://stemforall2022.videohall.com/presentations/2619

We encourage to you check out all the videos, join the discussion, and vote for your favorite videos at https://stemforall2022.videohall.com/

# Former CRA Board Chair Dan Reed Elected Chair of the National Science Board

CRA
Computing Research Association

*By Brian Mosley, CRA Senior Policy Analyst*

Last Friday, the National Science Board (NSB) elected former CRA Board Chair Daniel Reed, from the University of Utah, as its next chair. The NSB oversees the operations of the National Science Foundation (NSF) and, "identifies issues that are critical to NSF's future, approves NSF's strategic budget directions and the annual budget submission to the Office of Management and Budget, and approves new major programs and awards," according to the body's website. It also serves as, "an independent body of advisors to the President and Congress on policy matters related to science and engineering and education in science and engineering." Dr. Reed was appointed to the NSB in 2018. He served on the CRA Board of Directors from 1999 to 2009 and was chair from 2005 to 2009; he currently serves on the CRA Government Affairs Committee.

At this critical juncture for NSF – with the focus on emerging technologies, the creation of the new Directorate for Technology, Innovation, and Partnerships (TIP), and the pending NSF legislation in Congress which will likely reshape the mission of the agency – it's crucial to have someone from the computing and IT research community helping to steer the NSB in its oversight of the agency and in crafting Federal science policy. We wish to congratulate Dr. Reed on this great honor, and we look forward to working with him as he continues to serve the Nation in this new role!

# Professional Opportunities

## Arizona State University

*Lecturer (all ranks) – Computer Science*

*School of Computing, Informatics, and Decision Systems Engineering*

The School of Computing and Augmented Intelligence (SCAI) in the Ira A. Fulton Schools of Engineering at Arizona State University (ASU) seeks applicants for multiple full-time lecturer positions beginning August 2022. This position is in primary support of the Computer Science and Engineering programs, but lecturers are expected to support the instructional mission of all SCAI programs. SCAI has locations on the Tempe and Polytechnic Campuses so some travel between locations should be expected. In addition, SCAI has an online presence and faculty participate in the creation of curriculum and delivery of instruction in the online modality. This is a non-tenure-track appointment with a fixed-term academic year contract. Appointments will be made at the rank of Principal Lecturer, Senior Lecturer or Lecturer commensurate with the candidate's experience and accomplishments. Opportunities exist to augment the academic year salary by assisting with summer instruction.

Application deadline is May 16, 2022. Applications will continue to be accepted on a rolling basis for a reserve pool. Applications in the reserve pool may then be reviewed in the order in which they were received until the position is filled. For complete qualification/application information, see *https://hiring.engineering.asu.edu/*.

For further information or questions about this position please contact Vice Dean James Collofello (*james.collofello@asu.edu*)

A background check is required for employment. Arizona State University is a VEVRAA Federal Contractor and an Equal Opportunity/Affirmative Action Employer. All qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, disability, protected veteran status, or any other basis protected by law.

(See *https://www.asu.edu/aad/manuals/acd/acd401.html* and *https://www.asu.edu/titleIX/*.)

In compliance with federal law, ASU prepares an annual report on campus security and fire safety programs and resources. ASU's Annual Security and Fire Safety Report is available online at *https://www.asu.edu/police/PDFs/ASU-Clery-Report.pdf* You may request a hard copy of the report by contacting the ASU Police Department at 480-965-3456.

**COVID-19 Vaccination** - Arizona State University is a federal contractor and subject to federal regulations which may require you to produce a record of a COVID-19 vaccination. For questions about medical or religious accommodations, please *visit the Office of Diversity, Equity and Inclusion's webpage*.

## Australian National University

*Tenure Track Faculty*

The School of Computing at The Australian National University (ANU) seeks applicants to fill several tenure track faculty positions in all areas of computer science. ANU expects, rewards, and supports a strong primary commitment to excellence in teaching, and is committed to building a diverse and inclusive community. ANU provides attractive benefits and excellent support to maintain a healthy work/life balance.

We are also committed to supporting the next generation of women in leadership through the Pioneering Women Fellowship scheme. This scheme is open to women who are successful in their application to the School of Computing tenure track program.

**For a detailed position description and to apply, please visit** *https://jobs.anu.edu.au/en/job/540228*.

## Barnard College

*Roman Family Research and Teaching Fellow*

Barnard Computer Science is hiring a Roman Family Research and Teaching Fellow in Computer Science. This endowed faculty fellow position is a full-time two-year faculty position with the option of extending for a third year. Fellows will engage in teaching and in research, and will be expected to participate in curriculum and program development, undergraduate advising, and mentoring of undergraduate research. Candidates

# Professional Opportunities

should have a promising research agenda and record of scholarship and a demonstrated commitment to undergraduate teaching, mentoring, and increasing diversity in computer science.

More info:
*https://cs.barnard.edu/roman-fellow*.

## Binghamton University

*Lecturer Computer Science*

The Department of Computer Science, located within the Thomas J. Watson College of Engineering at Binghamton University invites applications for two full-time lecturer appointments to contribute to the newly established Information Systems program. The successful candidate will teach required and elective graduate courses in the Information Systems program in both laboratory and lecture settings. Courses will focus on Applied Data Science, Cybersecurity, and Web-Based Information Systems.

Binghamton University is one of four research universities in the State University of New York System and an R1 research institute. The Computer Science Department has well established Ph.D. and M.S. programs and an accredited B.S. program.

Applicants with a Ph.D. degree in Information Systems, Computer Science, or a related field by appointment date, are strongly preferred. Applicants with a master's degree, along with significant industrial experience in Information Systems, Computer Science, or a closely related field, with additional professional certifications, will also be considered. Applicants must demonstrate the ability to teach effectively.

*Apply here*

## Columbia University

*Postdoctoral Research Scientist*

**LINK TO APPLY:**
*apply.interfolio.com/89896*

The Data Science Institute (DSI) at Columbia University invites applications for the position of a Data Post-Doctoral Scientist. The post-doc will work on new methods for scalable and privacy-respecting digital identity systems.

THE CITADEL
CYBER AND COMPUTER SCIENCES

### Tenure-Track Assistant Professor or Instructor of Cyber Operations

Located in beautiful Charleston, S.C., The Citadel is a fully accredited, public, comprehensive, co-educational college with a student body of 2300 undergraduate and 1000 evening and graduate students. **Since 2016, The Citadel has been designated as a National Center of Academic Excellence in Cyber Defense Education by the National Security Agency and Department of Homeland Security.** The Department of Cyber and Computer Sciences has 5 full-time faculty and 7 adjunct faculty members. The department offers the B.S. in Computer Science; B.S. in Cyber Operations; M.S. in Computer and Information Sciences (jointly with the College of Charleston); graduate certificates in cybersecurity, and software engineering; and undergraduate minors in cybersecurity, cyber inter-disciplinary studies, data science, and computer programming. Teaching responsibilities include undergraduate courses in computer science and cyber operations for majors and minors and graduate-level courses in computer and information sciences and cybersecurity. A normal teaching load is 9-12 hours per week with small class sizes.

The primary role of the faculty is the education of students in the classroom and advising the students with their academic programs. Faculty members are also responsible for scholarly activity and service. The Citadel supports faculty scholarship and professional development. Internal funding is available for research, development, and travel. The contract is a full-time, 9-month position. Candidates should exemplify The Citadel's core values of honor, duty, and respect.

**Required Qualifications, Tenure-track Assistant Professor:** An earned doctoral degree in Computer Science, Cyber Operations, or closely-related discipline; and a strong aptitude for teaching courses in Cyber Operations. **Required Qualifications, Instructor:** An earned Master's degree in Computer Science, Cyber Operations, or closely-related discipline; and a strong aptitude for teaching courses in Cyber Operations.

**Additional Comments:** Salary and fringe benefits are competitive, and other benefits include convenient parking and access to the Citadel Beach House located on Isle of Palms.

In addition to the online application, please attach or send in the following materials: curriculum vitae, copies of graduate transcripts, a statement of teaching philosophy, a statement of research plans (needed for Tenure-track Assistant Professor position), and three letters of recommendation, with at least one that addresses applicant's teaching. All application materials should be submitted online at The Citadel Careers website: www.citadel.edu/careers. If you have any questions or concerns while applying at the Citadel Careers web site, please call The Citadel's Human Resources Office at 843-953-6922.

Questions about the position may be directed to Dr. Michael Verdicchio, Associate Professor, Cyber and Computer Sciences Faculty Search Committee, Department of Cyber and Computer Sciences, The Citadel, 171 Moultrie Street, Charleston, SC 29409, phone: 843-953-6987, or by email: mv@citadel.edu.

*Applications from women and minorities are especially encouraged. The Citadel is an affirmative action/equal opportunity employer actively committed to ensuring diversity in all campus employment.*

**citadel.edu/ccs**

# Professional Opportunities

These systems will provide digital identities suitable for low-infrastructure environments, used to facilitate access to resources such as medical care, education and food assistance. These highly secure systems will provide unprecedented new levels of resistance to identity theft.

The candidate will evaluate existing digital identity proposals, identify gaps in capabilities, develop new components of identity systems, work with external stakeholders and experts in privacy and international development, and prototype digital identity components or systems.

**Qualifications**

Minimum degree required:

Candidates must have a doctorate degree in a discipline such as a computer science or electrical engineering.

**Preferred Qualifications:**

- Strong background in computer science or electrical engineering, e.g., in systems security, cryptography, biometrics, networks or operating systems.
- Strong analytical, computational, and quantitative skills.
- Demonstrated outreach skills, such as working with NGOs or standards bodies.

## DePaul University

*Postdoctoral Research Position*

The Data Systems and Optimization Lab (DSL) in the School of Computing, College of Computing and Digital Media at DePaul University is looking for a talented and motivated postdoctoral fellow. Researchers in databases, systems, high-performance computing or any relevant data and computational science discipline, who have received their Ph.D. within the last three years are encouraged to apply. A keen interest toward technology transfer and entrepreneurship is a plus. The successful applicant will receive a competitive salary, commensurate with Chicago area, and excellent benefits. The position is for up to two years beginning May 15th, 2022.

This post-doctoral position will be in the broad areas of data provenance/lineage, data governance compliance, and scientific data management. The objective of this multidisciplinary project will be to develop data provenance models and implementation strategies for both relational and non-relational database systems. Technology transfer component of the project would involve working directly with scientists and data curators to adapt provenance models to domain-specific applications for reproducibility and data governance. The chosen candidate will work with a large group consisting of supervisors, PhD students, and several collaborators.

Supervisors

Dr. Alexander Rasin and Dr. Tanu Malik

To apply please email your CV and a Research Statement to arasin at *cdm.depaul.edu*.

## Florida Gulf Coast University

*Assistant/Associate/Full Professor, Computing and Data Science (R0002516)*

Cluster Hire: Thriving university in robust Southwest Florida seeks dynamic computing and data science faculty

Florida Gulf Coast University (FGCU) seeks candidates for seven positions with expertise in cross-disciplinary curricula and research.

1. Cybersecurity (CCDS-01)
2. Data Analytics and FinTech (CCDS-02)
3. Biomedical Computing/Health Informatics (CCDS-03)
4. Computational Statistics (CCDS-04)
5. Hydroinformatics (CCDS-05)
6. Computer Science or Engineering Education and Technology (CCDS-06)
7. Entrepreneurship of Advanced Technologies (CCDS-07)

**For more information and to apply visit:** *https://www.fgcu.edu/hr/jobs-at-fgcu*

FGCU is an EOE AA M/F/Vet/Disability Employer

## Hampden-Sydney College

*Visiting Assistant Professor of Computer Science*

The Department of Mathematics and Computer Science at Hampden-Sydney College invites applications for a Visiting Assistant Professor of Computer Science position beginning August 2022.

For more details and to apply, see: *http://apply.interfolio.com/104595*.

## Founding Tenured/Tenure-Track Faculty

The Hong Kong University of Science and Technology (HKUST) is a leading international university ranked 1st by Times Higher Education Young University Rankings 2020 and 27th by QS World University Rankings 2021. HKUST establishes a new campus in Guangzhou, China (hkust-gz.edu.cn). The Guangzhou campus synergizes with and maintains the same academic standard as the Clear Water Bay campus. Microelectronics Thrust is an academic department in the Guangzhou campus and focuses on integrating novel electronic and photonic devices into circuits, architecting information systems, and automating their designs and optimizations.

THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY (GUANGZHOU)

Microelectronics Thrust has multiple tenured/tenure-track positions at the ranks of Assistant Professor, Associate Professor, and Professor. Applicants should have a PhD degree and research in areas such as:

- Compilation techniques; operating system; system software
- Processor, memory, and storage system architecture; reconfigurable architecture; interconnection network; multiprocessor
- HPC and data center; embedded system; system-on-chip; system-in-package; quantum computing; neural computing; approximate computing; power management; thermal management
- Electronic design automation; photonic design automation; hardware-software codesign; modeling and simulation technology
- RF/mm-Wave/terahertz technology; integrated photonic circuit; memory device; quantum device; emerging technology

English is the instruction and administration medium at the Guangzhou campus, and a good command of written and spoken English is required.

- Applicants of tenure-track Assistant Professor should demonstrate strong research and teaching potentials.
- Applicants of Associate Professor should have a proven record in research, teaching, student supervision, and funding.
- Applicants of Professor should have world-class academic achievements, international academic leadership, and an established track record in teaching, student supervision and funding.

**Salary and Conditions:** Salary is of international standard and highly competitive. Generous research funding, ample laboratory space, and excellent research equipment and support will be provided. All the positions are tenured/tenure-track appointments in mainland China and offered by the HKUST mainland entity in accordance with the local employment laws and regulations. The appointments to Full Professor and some Associate Professor will be made on substantive basis. The initial appointments to Assistant Professor will be made on a fixed-term contract of up to three years, and re-appointments thereafter will be subject to performance and mutual agreement.

**Application Procedure:** Applications should be submitted at https://facrecruit.hkust.edu.hk which will be open until the positions are filled. If there is any question, please contact the Acting Head, Prof. Jiang Xu, at jiang.xu@ust.hk. HKUST is committed to equal opportunity and diversity in recruitment and employment. We strongly encourage candidates of diverse backgrounds to apply.




# Professional Opportunities

## Iowa State University

*Assistant Teaching Professor of Computer Science*

The Department of Computer Science in the College of Liberal Arts and Sciences at Iowa State University is accepting applications for a term faculty position at the rank of Assistant Teaching Professor.

Responsibilities will include instruction in computer science courses, mainly at the undergraduate level, and may include lectures in a large classroom setting and supervision of teaching assistants who would cover smaller hands-on lab sections.

The Computer Science department resides in the College of Liberal Arts and Sciences offering B.S., M.S., and Ph.D. degrees in Computer Science and an M.S. degree in Artificial Intelligence. The department is proud to be one of the founding departments for the B.S. in Software Engineering, B.S. in Data Science, Data Science Minor and Certificate along with the B.S. and Ph.D. degrees in Bioinformatics and Computational Biology. We are active in interdepartmental graduate programs in Bioinformatics and Computational Biology, Human-Computer Interactions, and Information Assurance. The Computer Science department has 38 faculty professionals, 723 B.S. students, 56 M.S. students, and 152 Ph.D. students.

We are seeking candidates who share in our mission of achieving excellence through diversity and inclusion. In the Department of Computer Science, and at the University as a whole, we translate the values of diversity and inclusion into action by seeking a diverse faculty and by seeking individuals who have experience working with diverse students, colleagues, staff, and constituents.

To apply for this position and for more information see *https://isu.wd1.myworkdayjobs.com/en-US/IowaStateJobs/details/Assistant-Teaching-Professor-in-Computer-Science_R7803?jobFamilyGroup=ad349100dff401ea127be90a060a22e3*.

To ensure full consideration of your application, please submit all materials no later than April 15, 2022. Please send an email to *cs-search@iastate.edu* with any questions.

Iowa State University is an Equal Opportunity/Affirmative Action employer. All qualified applicants will receive consideration for employment without regard to race, color, age, religion, sex, sexual orientation, gender identity, genetic information, national origin, marital status, disability, or protected veteran status and will not be discriminated against.

## Iowa State University

*Software Engineering Assistant/ Associate/Full Teaching Professor*

The Department of Electrical and Computer Engineering at Iowa State University invites applications for a term teaching faculty member at the Assistant, Associate, or Full Teaching Professor level to coordinate and teach undergraduate courses in the software engineering program (overseen by the College of Liberal Arts & Sciences and the College of Engineering) per academic year. These courses must be taught in person. This is a full-time term faculty, 9-month position for an initial 3-year term with potential for renewal.

Iowa State University is an Equal Opportunity/Affirmative Action employer.

**Apply online at** *https://tinyurl.com/ISUECEJobsR7672*

For full consideration, applications must be received by May 31, 2022.

## Lawrence Berkeley National Laboratory

AM-Applied Mathematics and Computational Research

Lawrence Berkeley National Laboratory is seeking a dynamic scientific leader with an outstanding reputation and record of research accomplishments in applied math, computational science, or computer science to serve as the Director of the Applied Mathematics and Computational Research (AMCR) Division. This is an unparalleled opportunity to lead a research program that is internationally recognized for excellence in applied mathematics, computer science, and computational research, and to foster an environment that supports high-quality scientific research in foundational and groundbreaking fields and further advances in computing and mathematics.

**Apply at** *http://50.73.55.13/counter.php?id=224868*

# Professional Opportunities

JOHN JAY COLLEGE OF CRIMINAL JUSTICE

## Lecturer - The Department of Mathematics and Computer Science (Multiple Positions)

**Job ID** 23935
**Location** John Jay College
**Full/Part** Time Full-Time
**Regular/Temporary** Regular

**FACULTY VACANCY ANNOUNCEMENT**

**ABOUT JOHN JAY COLLEGE**
John Jay College of Criminal Justice is a senior college of the City University of New York (CUNY) and an internationally recognized leader in educating for justice. Led by President Karol V. Mason, John Jay is a federally designated Hispanic-serving institution, it is ranked third in the nation in Black student success, and it is a top ten institution for promoting student social mobility. John Jay is proud to serve a diverse and dynamic student body of 15,000 students that includes nearly fifty percent students who are first in their family to attend college as well as students who are immigrants, from low-income families, or from other historically underrepresented groups in higher education.

The College participates in the doctoral programs of the Graduate Center of CUNY, and offers bachelor's and master's degrees both in traditional criminal justice-related fields of study as well as in a robust portfolio of liberal arts and sciences programs that highlight themes of justice across the arts, sciences, humanities, and social sciences. The College seeks staff and faculty members who thrive in multicultural academic environments and are committed to access and excellence in higher education.

**POSITION OVERVIEW**
The Mathematics & Computer Science Department of John Jay College of Criminal Justice (CUNY) invites applications for two full-time lecturer positions in Computer Science to begin fall semester 2022. The department currently employs 16 tenure-track and 13 lecturer faculty who together support a thriving undergraduate Computer Science major, as well as a graduate program in Cybersecurity and an undergraduate Applied Mathematics major with a concentration in data science. Lecturing faculty are valued members of the Department and have many opportunities for collaboration and professional growth.

The position of lecturer is tenure-bearing through what is called a "certificate of continuous employment" (CCE) after the sixth annual reappointment. This position of lecturer is a teaching position with a course load of eight classes per year in addition to major expectations of departmental service. There is no expectation of research or publication. As demonstrated in John Jay College's Seven Principles for a Culturally Responsive, Inclusive, and Anti-Racist Curriculum, **principles_for_a_culturally_responsive_inclusive_and_antiracist_curriculum_adopted_by_college_council_april8_2021.pdf (cuny.edu)** , the College seeks a faculty member who thrives in a multicultural, collaborative academic environment and is committed to both access and excellence in higher education.

CUNY anticipates a return to fully onsite work in Fall 2022 and this position is based in New York, NY.

**QUALIFICATIONS**
**Minimum Qualifications:**
Bachelor's degree in area(s) of expertise, and the ability to teach successfully.

**Preferred Qualifications:**
A PhD in computer science or a related field is preferred, but candidates with a master's degree are also invited to apply. We welcome those with teaching experience and a passion for educating.

The ideal candidate will be enthusiastic about teaching introductory computer science topics. These include first-year programming in C++ and Python, architecture, and data structures. There are also opportunities to teach traditional CS subjects, including data science, cybersecurity, and operating systems. Some workload may be devoted to administrative service and the development of new curricula. Applicants with expertise in data science, cybersecurity, and innovative teaching are especially encouraged to apply.

The College is deeply devoted to diversity and inclusion, and welcomes applicants from traditionally underrepresented groups. John Jay is a recognized MSI and HSI, and enjoys a cosmopolitan student body, reflective of the great cultural variety found in our home city of New York.

CUNY offers faculty a competitive compensation and benefits package covering health insurance, pension and retirement benefits, paid parental leave, and savings programs. We also provide mentoring and support for research, scholarship, and publication as part of our commitment to ongoing faculty professional development.

**COMPENSATION**
CUNY offers faculty a competitive compensation and benefits package covering health insurance, pension and retirement benefits, paid parental leave, and savings programs. We also provide mentoring and support for research, scholarship, and publication as part of our commitment to ongoing faculty professional development.

**HOW TO APPLY**
If you are viewing the job posting on any website other than CUNYFirst, please follow the instructions below:
-Go to **www.cuny.edu/employment**
-Click "Search job postings."
-Click the link for "Faculty" and browse to job Opening ID number 23935
-Click on the "Apply Now" button and follow the instructions

Once registered or logged in, candidates should submit the following: an application letter with a statement of teaching and research interests and on your contribution to the diversity goals of our college, C.V., names of three references along with contact information, and proof of degree or progress toward the degree. A statement on your contribution to the diversity goals of our college would also be welcome. All items to be uploaded must be combined in a single document preferably in PDF format.

**CLOSING DATE**
Review of resumes to begin March 28, 2022.
Posting closes on April 14, 2022.

**JOB SEARCH CATEGORY**
CUNY Job Posting: Faculty

**EQUAL EMPLOYMENT OPPORTUNITY**
CUNY encourages people with disabilities, minorities, veterans and women to apply. At CUNY, Italian Americans are also included among our protected groups. Applicants and employees will not be discriminated against on the basis of any legally protected category, including sexual orientation or gender identity. EEO/AA/Vet/Disability Employer.

## Lewis University

*Assistant Professor, Computer and Mathematical Sciences*

Responsible to model the University Mission through dedicated job performance, service excellence to constituencies, respectful collaboration, and active support of the University's Mission in Catholic and Lasallian higher education.

- Teach 24 credit hours per academic year
- Service to the department and university
- Continued professional development, broadly defined.

The new faculty member will teach and regularly update a variety of courses for our undergraduate and graduate computer science programs. The new faculty member will assist with the program's efforts to earn ABET accreditation, including collecting and organizing assessment data. The new faculty member will help the Department Chair identify budget items to keep the computer science labs up-to-date. The new faculty member will conduct research projects with undergraduate and graduate students.

### Minimum Qualifications

The candidate must have a PhD in Computer Science or related discipline. The candidate must have a passion for teaching a variety of computing science courses to undergraduate and graduate students and to engage in research related to computer science, particularly Artificial Intelligence, Cybersecurity or Software Engineering. The candidate must be an innovative self-starter willing to design, implement, and teach new courses in computer science and to help develop interdisciplinary opportunities between computer science and other fields.

*Apply here*

## McMaster University

*Department of Computing and Software*

*Teaching-Track Faculty Position*

McMaster University is located on the traditional territories of the Haudenosaunee and Mississauga Nations and, within the lands protected by the Dish with One Spoon wampum agreement.

### Position Description

McMaster University's Faculty of Engineering invites applications for a teaching-track faculty position at the rank of Assistant Professor in the Department of Computing and Software; however, exceptional candidates may be considered at the rank of Associate Professor or Professor. The positions will be located on the main university campus to begin on July 1, 2022, or shortly thereafter.

The Department seeks to recruit an excellent teacher with interest and experience in experiential learning and

innovative ways of teaching computing. Successful candidates will be expected to:

- Teach introductory undergraduate courses in Computer Science and Software Engineering, as well as courses within the common first-year engineering program (Engineering 1).
- Contribute towards the delivery of the Department's undergraduate programs, e.g., by mentoring Computer Science, Software Engineering, and Mechatronics Engineering students and introducing new teaching techniques.
- Participate in the ongoing development of curricula for our Computer Science B.A.Sc. program, Software Engineering B.Eng. program, Mechatronics Engineering B.Eng. program, and Engineering 1 program.
- Develop a pedagogy-related research program in computing.

Registration, or eligibility for registration, by the Professional Engineers of Ontario is required. Salary and rank are commensurate with experience and qualifications.

The successful applicant will hold a PhD in Computer Science, Software Engineering, or a related discipline. Alternatively, applicants will hold a doctorate in education, with a focus on computing. The applicant must also demonstrate a record of excellence in teaching, reflected in outstanding teaching records, and a willingness and ability to contribute to the department's collegial and collaborative intellectual community as well as university-wide inclusive excellence goals and priorities. Applicants are expected to have demonstrated successful pedagogical research, or to show potential for successful pedagogical research.

The Department of Computing and Software is one of the top departments for Computer Science and Software Engineering in Canada. We have over 30 faculty members with expertise in computer systems, software engineering, theoretical computer science, security, privacy, machine learning, data analytics, scientific computing, and bioinformatics. The department mentors over 1400 undergraduate students in three programs: computer science, software engineering, and mechatronics engineering. It also mentors more than 120 graduate students in masters and doctoral programs in computer science and software engineering.

McMaster Engineering has a reputation for innovative programs, cutting-edge research, leading faculty, and aspiring students. With over 190 faculty members who mentor approximately 7,500 undergraduate and over 1,250 graduate students, about half of whom are doctoral students, we have earned a strong reputation as a centre for academic excellence and high impact research and innovation. Discover more of what McMaster Engineering and the Hamilton area have to offer academic professionals and their families by reviewing our Information Guide highlighting our research excellence, family-friendly resources and rich local culture. Opportunities for continuous personal and professional growth are also made available through the Faculty of Engineering's Fireball Academy and the MacPherson Institute.

**Commitment to Inclusive Excellence**

The diversity of our workforce is at the core of our innovation and creativity and strengths our research and teaching excellence. In keeping with its Statement on Building an Inclusive Community with a Shared Purpose, McMaster University strives to embody the values of respect, collaboration and diversity, and has a strong commitment to employment equity.

The University seeks qualified candidates who share our commitment to equity and inclusion, who will contribute to the diversification of ideas and perspectives, and especially welcomes applications from First Nations, Métis and Inuit peoples, members of racialized communities ("visible minorities"), persons with disabilities, women, and persons who identify as 2SLGBTQ+.

We invite all applicants to complete a brief Diversity Survey as part of the application process. It takes approximately two minutes to complete. All questions are voluntary, with an option to decline to answer. All information collected is confidential and will be used to support efforts to broaden the diversity of the applicant pool and to promote a fair, equitable and inclusive talent acquisition process. Inquiries about the Diversity Survey may be directed to *hr.empequity@mcmaster.ca*.

Job applicants requiring accommodation to participate in the hiring process

should contact the Office of the Dean of Engineering at 905-525-9140 ext. 24900 to communicate accommodation needs.

**How to Apply:**

Please submit the following materials through the University's electronic portal: *www.workingatmcmaster.ca/careers/*[Job Opening # 44653]:

*https://careers.mcmaster.ca/psp/prepprd/EMPLOYEE/HRMS/c/HRS_HRAM.HRS_APP_SCHJOB.GBL?*

Dr. Mark Lawford, Chair
Department of Computing and Software
1280 Main Street West
McMaster University,
Hamilton, ON Canada L8S 4L7

- a letter of application describing the impact that career interruptions have had on academic productivity, if applicable,
- curriculum vitae
- a teaching dossier that includes a teaching philosophy, as well as evidence of teaching experience;
- a brief statement describing the contributions you have made or plan to make to inclusive excellence in teaching, research, or service in academic, professional or community contexts (2-page maximum), and
- the names of at least four referees that speak to academic and teaching performance. Letters of reference are not required and will not be reviewed at the application stage. The Department will request letters of recommendation from referees at later stages of the search process.

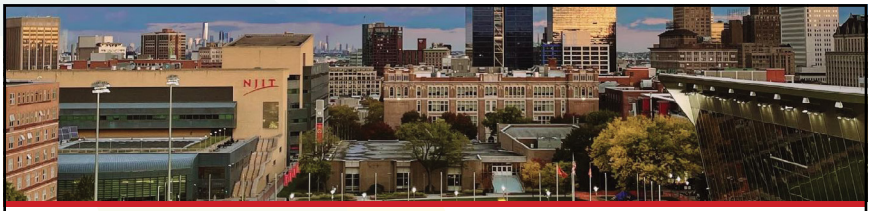
Complete applications that are received by May 15, 2022, will receive full consideration. Review of applications will continue until the position is filled. The effective date of appointment is negotiable, but July 1, 2022, is preferred. All applicants will receive an online confirmation of receipt of their application; however, only short-listed applicants will be contacted for interviews.

All qualified candidates are encouraged to apply; however, Canadian citizens and permanent residents will be given priority. To comply with the Government of Canada's reporting requirements, the University gathers information about applicants' status as either a permanent resident of Canada or Canadian citizens. Applicants need not identify their country of origin or current citizenship; however, all applications must include one of the following statements:

Yes, I am a citizen or permanent resident of Canada

No, I am not a citizen or permanent resident of Canada

The University is committed to providing and maintaining healthy and safe working and learning environments for all employees, students, volunteers, and visitors. In accordance with the University's Vaccination Policy-COVID-19 Requirements for Employees and Students, effective October 18, 2021, all McMaster community members, including employees, accessing a McMaster campus or facility in person are required to be fully vaccinated or to have received an exemption from the University for a valid human rights ground. This is a term and condition of employment. The University will continue to follow the guidance of public health organizations to define fully vaccinated status.




NJIT
New Jersey Institute of Technology

**Lecturer Opening at NJIT (Applied Cybersecurity)**

The Department of Computer Science at New Jersey Institute of Technology invites University Lecturer/Senior University Lecturer candidates starting in Fall 2022. Successful candidates must have an MS (or higher) degree in Computer Science or a related computing area and have an expert grasp of knowledge of the Cybersecurity field at all levels, either through a demonstrated record of teaching excellence, or through industrial experience. Candidates are expected to teach courses under the umbrella of Cybersecurity in support of our graduate and undergraduate programs. The successful candidate will also be involved in creating course content and materials with a focus on hands-on experiential and project-based learning.

Interested applicants should submit their CV by applying as soon as possible at:

**https://apptrkr.com/2992151**

Further information is available at the following link: *https://covid19.mcmaster.ca/vaccination-mandate/*. More information on the University's Health and Safety framework is available online at *https://hr.mcmaster.ca/resources/covid19/*. Questions regarding the above requirements or any accommodation requests through the recruitment process can be directed to *hr.mcmaster@mcmaster.ca*.

Direct any inquiries about this position to *chaircas@mcmaster.ca*

## Northwestern University

*Non-Tenure Track Assistant Chair in the Computer Science Department*

### Statement of Duties

The Department of Computer Science (CS) at Northwestern University is seeking to hire an Assistant Chair. The successful candidate will serve as a member of our non-tenure-track teaching faculty and will typically teach one course per quarter. The candidate will also assist in administrative duties for the department's undergraduate and graduate programs. Responsibilities will likely include departmental administrative tasks to help the smooth running of the department (course scheduling, course staffing, facilitating promotion and tenure review), interacting with students (advising, recruiting, career development, and of course teaching), curriculum development, and developing corporate relationships.

Applicants must have completed a PhD degree in Computer Science, Computer Engineering, or a closely related field, have a demonstrated excellence in teaching and have a strong interest in advancing CS at Northwestern. This is a multi-year, renewable position.

### Minimum Qualifications and Other Credentials

*Assistant Chair*

- PhD degree in Computer Science, Computer Engineering, or a closely related field
- Demonstrated excellence in teaching and have a strong interest in advancing CS at Northwestern

### Proposed Start Date

Negotiable. September 1, 2022 preferred.

### Closing Date for Receipt of Applications

Review of applications will begin on April 20, 2022. Applicants are strongly encouraged to submit their materials before that date. Applications received after that date will be considered on a rolling basis.

### Application Materials

Applicants must apply online and upload the following application materials at *https://facultyrecruiting.northwestern.edu/apply/MTQ2OA==*

1. A Cover Letter
2. A Curriculum Vitae
3. Three to five letters of reference, at least one which is non-academic that speaks to management experience
4. A statement of teaching philosophy
5. An optional diversity statement that addresses how the candidate contributes to diverse excellence
6. Recent teaching evaluations (if applicable)

### EEO Statement

*Northwestern requires all staff and faculty to be vaccinated against COVID-19, subject to limited exceptions. For more information, please visit our COVID-19 and Campus Updates website.*

*The Northwestern campus sits on the traditional homelands of the people of the Council of Three Fires, the Ojibwe, Potawatomi, and Odawa as well as the Menominee, Miami and Ho-Chunk nations. We acknowledge and honor the original people of the land upon which Northwestern University stands, and the Native people who remain on this land today.*

*Northwestern University is an Equal Opportunity, Affirmative Action Employer of all protected classes, including veterans and individuals with disabilities. Women, racial and ethnic minorities, individuals with disabilities, and veterans are encouraged to apply. Click for information on EEO is the Law.*

## NYU Tandon School of Engineering

*Visiting Faculty, Computer Science and Engineering*

The Department of Computer Science and Engineering (CSE) at the NYU Tandon

School of Engineering (NYU Tandon) invites applications for an open-rank 1-year visiting faculty position, beginning **September 1, 2022**. The visiting faculty member is expected to contribute to both research and teaching in the department. The teaching load will be a maximum of 3 courses for the year.

### Qualifications

You should have a Ph.D. degree in computer science or a closely related discipline. We seek individuals with evidence of excellent scholarship and teaching ability.

### Application Instructions

Please submit the following materials electronically:

- Cover letter
- Current CV
- Teaching statement
- Research Statement
- A statement of your experience with or knowledge of *inclusion, diversity, equity, and belonging efforts* and your plans for incorporating them into your teaching, research, mentoring, and service.
- Recent teaching evaluations (if available)
- Names and contact information for three references. Referees will upload confidential letters of reference in the Interfolio system.

Apply Here: *https://apply.interfolio.com/104697*

We will review applications as they are received and will continue until we fill the position. We encourage you to submit as soon as possible. Should you have any questions please contact Lisa Hellerstein at *lisa.hellerstein@nyu.edu.*

### About Us

New York University (NYU) is one of the top private universities in the United States. NYU Tandon has an illustrious past as Brooklyn Poly and NYU Polytechnic School of Engineering. Our mission is to excel in research, teaching and entrepreneurship. We aim to inspire and educate engineers for the 21st century. NYU Tandon faculty are world renowned leaders in science and technology, with a strong commitment to research, innovation, and entrepreneurship that make a difference in the world. With NYU's unrivaled global network of campuses, we promote a truly global engineering education. We are deeply committed to teaching and learning, and we lead in online education and in K-12 STEM outreach. Our students conduct Vertically Integrated Research projects and participate in an extensive undergraduate summer research program.

The Department of Computer Science and Engineering (CSE) at the NYU Tandon School of Engineering (NYU Tandon) is home to centers and research teams that are among the top groups in the country.

Departmental research areas include big data management, analysis and visualization, imaging, security and privacy, algorithms and theory, and machine learning. We have groups working in interdisciplinary research areas like AI for games, fair and responsible data science, cybercrime, public health and social media, online political communication, urban computing, and sports analytics.

NYU Tandon is committed to substantially increase the proportion of our faculty from historically underrepresented groups in STEM and we encourage candidates from such groups to apply. We aspire to create a climate where diversity and inclusion are not only appreciated but considered an asset for creativity and innovation, and we seek faculty who have a real passion for a culturally diverse environment. We take pride in our high numbers of female students and students who are the first in their family to go to college. NYU belongs to the Higher Education Recruitment Consortium (HERC), which assists with dual-career searches, and our faculty are supported by a range of work-life balance programs provided by the *NYU Office of Work Life.*

## NYU Tandon

*Contract Faculty*

The Department of **Computer Science and Engineering** at the NYU Tandon School of Engineering invites applications for three full time, non-tenured, renewable faculty positions in **Computer Science,** at the level of Industry Assistant Professor or Industry Associate Professor, with start dates of **September 1, 2022** or **January 2, 2023.**

### Qualifications

We invite applicants for classroom teaching in all areas of Computer Science, including a broad range of undergraduate

and graduate courses, including, but not limited to algorithms, software engineering, artificial intelligence, machine learning, databases, operating systems, and security. You should be an excellent teacher with substantial experience. At least an MS degree or equivalent in Computer Science or a closely related discipline is required. A Ph.D. degree in **Computer Science** or a closely related discipline is a strong advantage, as is a record of industrial experience, but neither is necessary.

### Application Instructions

Please submit the following materials electronically:

- Cover letter
- Current CV
- Teaching statement
- A statement of your experience with or knowledge of *inclusion, diversity, equity, and belonging efforts* and your plans for incorporating them into your teaching, research, mentoring, and service.
- Teaching evaluations from students (if available)
- Teaching evaluations from peers (if available)
- Teaching portfolio, such as sample assignments
- Names and contact information for three references

**Apply Here:** *https://apply.interfolio.com/104142*

We will review applications as they arrive and will continue until we fill the position. We encourage you to submit early. Should you have any questions please contact Jeff Epstein at *jeff.epstein@nyu.edu*.

### About Us

New York University (NYU) is one of the top private universities in the United States. NYU Tandon has an illustrious past as Brooklyn Poly and NYU Polytechnic School of Engineering. Our mission is to excel in research, teaching and entrepreneurship. We aim to inspire and educate engineers for the 21st century. NYU Tandon faculty are world renowned leaders in science and technology, with a strong commitment to research, innovation, and entrepreneurship that make a difference in the world. With NYU's unrivaled global network of campuses, we promote a truly global engineering education. We are deeply committee to teaching and learning, and we lead in online education and in K-12 STEM outreach. Our students conduct Vertically Integrated Research projects and participate in an extensive undergraduate summer research program.

The Department of Computer Science and Engineering offers BS degrees in **Computer Science and Computer Engineering**, MS degrees in Computer Science, Computer Engineering, Cybersecurity, Cybersecurity Risk and Strategy, and a PhD degree in Computer Science. NYU Tandon is committed to substantially increase the proportion of our faculty from historically underrepresented groups in STEM and we encourage candidates from such groups to apply. We aspire to create a climate where diversity and inclusion are not only appreciated but considered an asset for creativity and innovation, and we seek faculty who have a real passion for a culturally diverse environment. We take pride in our high numbers of female students and students who are the first in their family to go to college. Tandon belongs to the Higher Education Recruitment Consortium (HERC), which assists with dual-career searches, and our faculty are supported by a range of services and programs provided by the *NYU Office of Work Life*.

## Syracuse University

*Maxwell School of Citizenship and Public Affairs*

*Director, Autonomous Systems Policy Institute (ASPI)*

Syracuse University invites applications for the Director of the *Autonomous Systems Policy Institute* (ASPI). Housed within the Maxwell School of Citizenship and Public Affairs and involving faculty from across Syracuse University, ASPI is dedicated to interdisciplinary scholarship and teaching related to the design, governance, and wider societal implications of autonomous systems and artificial intelligence. It aims to critically engage and shape the policy and ethical frameworks that will guide the design and use of these emerging technologies. Across its initiatives, ASPI endeavors to be the leader in uniting interdisciplinary scholarship and teaching related to emerging autonomous technologies, in integrating and thinking across different

sociotechnical systems, and in bringing academic insight, community needs, and industry developments into conversation and joint action.

Launched in 2019, ASPI includes 20 core faculty spread across Syracuse University and more than 130 faculty who are involved in some capacity. The Institute supports multiple interdisciplinary research teams as well as a speaker and research series, and has prioritized developing and maintaining strong relationships with key stakeholders in industry, advocacy, and government domains. Most recently, ASPI has launched initiatives including a graduate-student lab, regular industry roundtables, and an annual public symposium. Future plans include the creation of both undergraduate and graduate academic programs related to autonomous systems and artificial intelligence, innovative executive education programming, and additional faculty hires as part of a cluster hire initiative in *Artificial Intelligence, Autonomous Systems, and the Human-Technology Frontier*.

The director position in ASPI presents an exceptional opportunity for a visionary and collaborative academic leader with interests at the intersection of emerging autonomous technologies and policy. ASPI is unique among research institutes in its dual focus on the development of autonomous systems across multiple domains (e.g., mobility, healthcare, future of work, AI systems), as well as the need for deep and broad interdisciplinary engagement to understand the social and policy implications of these developments. Harnessing Syracuse University's strengths in public communications, management, design, computer science, and policy, ASPI offers its next director an ideal platform for establishing Syracuse University as the place for interdisciplinary, socially relevant research and teaching on autonomous systems and artificial intelligence.

For ASPI's director, we seek a senior scholar with a stellar research record related to autonomous systems and/or artificial intelligence and established experience in interdisciplinary engagement, program building, and translational work between and among academia, government, advocacy, and industry domains. Preference will be given to candidates who emphasize and demonstrate understanding of how the design, policy, and societal impacts of autonomous systems and artificial intelligence – ASPI's core focus – can be brought together in both scholarship and teaching. A record of extramural grant funding from a range of organizations is expected.

Candidates must have a Ph.D. and demonstrate expertise in policy, governance, and the societal implications of technology through their scholarship, leadership, and teaching. The successful candidate must meet the requirements of being hired as a full professor with tenure. The tenure home for the person hired will be determined in conversation with the candidate.

To apply for the position, candidates must complete an online faculty application (available at *https://www.sujobopps.com/postings/92261*) and submit a curriculum vitae and letter of interest. The search committee will begin reviewing applications on May 1. We will continue to consider applications until the position is filled.

Syracuse University is an Equal Opportunity Employer. Women, minorities, and individuals with disabilities are encouraged to apply. Successful candidates must be committed to working with diverse student and community populations.

## Underwriters Laboratories Inc.

*Executive Director, Digital Intelligence Safety Research Institute*

### THE SEARCH

Underwriters Laboratories Inc., in pursuit of its goal to be the world's leading safety science research and standards development organization, is seeking nominations and applications for the inaugural Director of its Digital Intelligence Safety Research Institute (DISRI). This position will lead, provide vision to, and grow an ambitious research program designed to position a new institute at the forefront of its field. In addition to internal research activities, the Director will craft education and engagement initiatives and explore entrepreneurial avenues to maximize global impact.

The ambitious growth expected for DISRI will be mirrored by corresponding growth planned for other research institutes of Underwriters Laboratories, including Fire Safety, Chemical Insights, and Electrochemical Safety. Concomitantly, scoping of other topical areas associated with emerging technologies is ongoing

as Underwriters Laboratories seeks to deploy resources expected soon to exceed $250M per year to most effectively advance its mission.

*Applications, Inquiries, and Nominations*

Screening of complete applications will begin immediately and continue until the completion of the search process. Inquiries, nominations, referrals, and resumes with cover letters should be sent via the Isaacson, Miller website for the search: *www.imsearch.com/8400*. Electronic submission of materials is strongly encouraged.

Andrew Lee, Managing Partner

Alexandra Lolavar, Associate

Isaacson, Miller

1800 K Street, NW Washington, DC 20036

Underwriters Laboratories is committed to hiring and retaining a qualified diverse workforce.

Underwriters Laboratories. is proud to be an Equal Opportunity/Affirmative

Action Employer, making decisions without regard to race, color, religion, creed, sex, sexual orientation, gender identity, marital status, national origin, age, veteran status, disability, or any other protected class.

UL has COVID-19 protocols and policies in place to ensure the safety of its employees, customers, and clients. Effective November 1, 2021, the company mandates that employees are vaccinated against COVID-19 as a condition of employment (except where prohibited by law), subject to reasonable accommodation as required by law.

## University of California, Riverside

*Lecturer in Computer Science and Engineering*

The Department of Computer Science & Engineering at the University of California, Riverside has need for part-time or full-time Lecturers beginning the Fall Quarter for the 2022/2023 academic year to teach courses in the following areas: Introductory Computer Science, Data Structures, Design and Analysis of Algorithms, Software and Information Systems, Technical Communications and Software Engineering.

Qualifications include a Ph.D. or M.S. degree in Computer Science or a related field, prior teaching experience is preferred.

Interested applicants must submit a cover letter, curriculum vitae, three letters of references, a teaching statement and/or recent teaching evaluations or other evidence of teaching, a contribution to diversity statement to the AP recruit website at *https://aprecruit.ucr.edu/JPF01499*.

Full consideration will be given to applications received by April 18, 2022

UCR is a world-class research university with an exceptionally diverse undergraduate student body. Its mission is explicitly linked to providing routes to educational success for underrepresented and first-generation college students. A commitment to this mission is a preferred qualification.

The University of California is an Equal Opportunity/Affirmative Action Employer. All qualified candidates will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, age, disability, protected veteran status, or any other characteristic protected by law.

**University of California COVID-19 Vaccination Program Policy**

As a condition of employment, you will be required to comply with the University of California SARS-CoV-2 (COVID-19) Vaccination Program Policy. All Covered Individuals under the policy must provide proof of Full Vaccination or, if applicable, submit a request for Exception (based on Medical Exemption, Disability, and/or Religious Objection) or Deferral (based on pregnancy) no later than the applicable deadline. For new University of California employees, the applicable deadline is eight weeks after their first date of employment.

## University of Central Florida

*Lecturer, Electrical and Computer Engineering*

The Department of Electrical and Computer Engineering (ECE) at the University of Central Florida (UCF) has an opening for a lecturer position. The primary responsibility of the position is teaching undergraduate courses related to computer engineering, embedded systems, signal processing, and introductory programming for ECE students. The anticipated starting date will be August 8, 2022. All applicants must have a Ph.D. in an

area appropriate to the ECE disciplines by the start of the appointment.

ECE has strong educational programs, with over 200 graduate students and 1,500 undergraduates, and state-of-the-art facilities, the L3Harris Engineering Center and Interdisciplinary Research 1 Building. Located in Orlando, UCF and ECE are at the center of Florida High Tech Corridor with an excellent industrial base in telecommunications, energy, computer systems, semiconductors, defense, space, laser, simulation, and software industries, as well as the world-renowned entertainment/theme park industry. Exceptional weather, easy access to seashore, one of the largest convention centers in the nation and an international airport ranked among the world's best are just a few features that make the UCF/Orlando area ideal. For more details regarding the ECE department and university, please visit *www.ece.ucf.edu* and *www.ucf.edu*.

UCF is an equal opportunity/affirmative action employer. All qualified applicants are encouraged to apply, including minorities, women, veterans and individuals with disabilities. As a Florida public university, UCF makes all application materials and selection procedures available to the public upon request.

Please send all inquiries to *ECE-FacultySearch@cecs.ucf.edu*.

Follow the link *https://jobs.ucf.edu/en-us/job/502118/lecturer-electrical-and-computer-engineering* to apply.

## University of Chicago Data Science Institute

*Postdoctoral Scholar, Data & Democracy Research Initiative*

The University of Chicago is seeking Postdoctoral Scholars focused on the intersection of democracy and data science. The postdoctoral scholar will be part of the new Data & Democracy research initiative, a major interdisciplinary collaboration jointly led by the University of Chicago Data Science Institute (DSI) and Center for Effective Government (CEG).

The Data & Democracy research initiative is a unique collaboration between computer scientists, statisticians and political scientists to better understand democracy in the digital age. This initiative will investigate critical questions concerning the impact of misinformation on effective government, how online communication translates into offline political behavior, and the implications of the consolidation of online media platforms for free speech. We invite researchers to join this initiative to spearhead new interdisciplinary research projects as part of a growing community of scholars.

Application review will begin March 21, 2022. However, the application will remain open until filled. Apply online.

*https://uchicago.inforeadyhire.com/#competitionDetail/1865941*
*effectivegov.uchicago.edu*

**Center for Effective Government**

At the Center for Effective Government, we work to strengthen institutions of democracy and improve the capability of our government to solve public problems.

## University of Chicago

*Full-time Teaching Positions in Masters Program in Computer Science*

The Masters Program in Computer Science (MPCS) in the Department of Computer Science at the University of Chicago invites applications for all ranks of the Clinical appointment (Assistant Clinical Professor of Computer Science, Associate Clinical Professor of Computer Science, and Clinical Professor of Computer Science) in the field of Computer Systems. The "Clinical" appointment is a full-time teaching-track position used in professionally-oriented programs at the University of Chicago. It is unrelated to clinics in a medical sense.

This full-time, benefits-eligible appointment is for an initial three-year term, with possibility of renewal. This is a teaching position with no research responsibilities, and a teaching load of six courses across three academic quarters of the year (Autumn, Winter, Spring).

The Masters Program in Computer Science offers a comprehensive and professionally-oriented computer science education that combines the foundations of computer science with the applied and in-demand skills necessary for careers in technology. Our rigorous curriculum covers theory, programming, and

# Professional Opportunities

applications and is targeted for students interested in tech careers in Software Engineering, Data Analytics, Product Management and Application Development.

Courses are held for nine weeks during each academic quarter, with the tenth week for a final project or exam. Instruction is expected to be primarily in person, with some limited opportunities to offer remote or hybrid courses.

The person holding this position must be able to teach at least two of the following courses: Introduction to Computer Systems, Advanced Computer Systems, Networks, Operating Systems, Distributed Systems, Parallel Programming, Compilers, Computer Architecture, Introduction to Computer Security, or Functional Programming. Syllabi for past offerings of these classes can be found at https://mpcs-courses.cs.uchicago.edu. Depending on the applicant's background and interests, the person holding this position may also be asked to teach other classes in the MPCS.

For each clinical position/rank, applicants should have one of the following: a doctorate in Computer Science or a related field at the time of appointment; a masters degree and 4 years of relevant professional experience; or a bachelor's degree and 8 years of relevant professional experience. Work experience in a computing-related industry is preferred. In addition, each rank has the following requirements:

For the Assistant Clinical Professor of Computer Science position we require teaching experience in Computer Science or a related field at the undergraduate or graduate level, as either an instructor of record or a teaching assistant.

For the Associate Clinical Professor of Computer Science position, candidates must have been the instructor of record in at least 1800 units of undergraduate and/or graduate course offerings in Computer Science or a related field over the span of at least six calendar years. 1800 units is typically equivalent to 18 quarter-long course offerings, or 12 semester-long course offerings. See *https://registrar.uchicago.edu/records/transcripts/transcript-key/credit-conversion-chart-equivalencies/* for equivalencies between teaching units and semester/quarter hours.

For the Clinical Professor of Computer Science position, candidates must have been the instructor of record in at least 3000 units of undergraduate and/or graduate course offerings in Computer Science or a related field over the span of at least 10 calendar years; 3000 units is typically equivalent to 30 quarter-long course offerings, or 20 semester-long course offerings. See *https://registrar.uchicago.edu/records/transcripts/transcript-key/credit-conversion-chart-equivalencies/* for equivalencies between teaching units and semester/quarter hours.

Applications must be submitted online through the University of Chicago's Interfolio website:

**Assistant Clinical Professor:**
*apply.interfolio.com/105497*

**Associate Clinical Professor:**
*apply.interfolio.com/105499*

**Clinical Professor:**
*apply.interfolio.com/105502*

Review of applications will begin on May 18, 2022 and will continue until the position is filled.

We seek a diverse pool of applicants who wish to join an academic community that places the highest value on rigorous inquiry and encourages diverse perspectives, experiences, groups of individuals, and ideas to inform and stimulate intellectual challenge, engagement, and exchange. The University's Statements on Diversity are at *https://provost.uchicago.edu/statements-diversity*.

The University of Chicago is an Affirmative Action/Equal Opportunity/Disabled/Veterans Employer and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender identity, national or ethnic origin, age, status as an individual with a disability, protected veteran status, genetic information, or other protected classes under the law. For additional information please see the University's Notice of Nondiscrimination. (*https://www.uchicago.edu/about/non_discrimination_statement/*)

Job seekers in need of a reasonable accommodation to complete the application process should call 773-702-1032 or email *equalopportunity@uchicago.edu* with their request.

# Professional Opportunities

## University of Chicago

*Instructional Professor (open rank)*

The Department of Computer Science in the Physical Sciences Division at the University of Chicago invites applications for teaching positions for the position of Instructional Professor (open rank). The selected candidate will be appointed as Assistant Instructional Professor, Associate Instructional Professor, or Instructional Professor, depending on qualifications and educational background. The appointment will be for a term of up to five years, renewable. This is a career-track position with potential progression, competitive salary, and benefits.

The terms and conditions of employment for this position are covered by a collective bargaining agreement between the Service Employees International Union (SEIU) and the University.

The University of Chicago is in the midst of an ambitious, multi-year effort to significantly expand its computing and data science. We seek individuals who can help us fulfill our educational objectives. Position responsibilities include teaching (average teaching load is two courses per quarter in the fall, winter and spring quarters), non-classroom instructional or service duties as needed, and professional development.

**Candidates must have either:**

- A doctorate in Computer Science or a related field at the time of appointment or;
- A masters degree and 4 years of relevant professional experience.

Prior university-level teaching experience, either as an instructor of record or as a teaching assistant, is required.

Candidates who are qualified to teach courses in one or more of the following areas are preferred: introduction to programming, computer systems, databases, data engineering, data visualization, and machine learning.

**Applications must be submitted online through the University of Chicago's Academic Jobs website:** *apply.interfolio.com/93078*.

**Review of applications will begin on October 15, 2022 and will continue until all positions are filled.**

**The following materials are required:**

- cover letter;
- curriculum vitae;
- description of teaching philosophy and experience; ability to interact with a diverse group of students is valued. Must include a list of courses that the candidate is qualified to teach;
- applicants are required to request at least three confidential letters of recommendation via Interfolio.

Optional: Candidates may submit teaching evaluations.

We seek a diverse pool of applicants who wish to join an academic community that places the highest value on rigorous inquiry and encourages diverse perspectives, experiences, groups of individuals, and ideas to inform and stimulate intellectual challenge, engagement, and exchange. The University's Statements on Diversity are at *https://provost.uchicago.edu/statements-diversity*.

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Job seekers in need of a reasonable accommodation to complete the application process should call 773-702-1032 or email *equalopportunity@uchicago.edu* with their request.

## University of Chicago

*Postdoctoral Scholar*

The University of Chicago is seeking a Postdoctoral Scholar focused on internet performance and measurement to work closely with Nick Feamster, Neubauer Professor of Computer Science and Faculty Research Director of the Data Science Institute (DSI). The Internet Equity project is a major interdisciplinary research initiative, funded by Data.org, focused on addressing the issue of Internet access by using large-scale Internet measurement and data science to help communities and stakeholders to better assess the quality and accessibility of broadband Internet access. Drawing on the University

of Chicago's top-ranked programs, world-renowned faculty, as well as a vibrant and quickly expanding data science ecosystem, this is an opportunity to engage in field-defining data science and artificial intelligence research. Our positions carry a competitive salary, generous research funding stipends, and benefits.

**Interested applicants can apply here:** *https://uchicago.inforeadyhire.com/#competitionDetail/1840566*

## University of Chicago

*Postdoctoral Scholar, Data & Democracy Research Initiative*

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**Application review will begin March 21, 2022. However, the application will remain open until filled.** *Apply online.*

## University of Maine

*Dean of Maine College of Engineering, Computing and Information Science*

The University of Maine (UMaine) invites applications and nominations for the inaugural position of Dean of the Maine College of Engineering, Computing and Information Science (MCECIS). The founding dean is the chief executive officer of the college and reports to the Executive Vice President for Academic Affairs and Provost. UMaine and its MCECIS partners seek a visionary academic leader and experienced administrator with a strong record of inclusive excellence and innovation in their own teaching and research programs to serve as its dean. For additional information about UMaine, MCECIS, and the opportunity, visit *this link*.

Although applications will be welcomed until a new dean is selected, for best consideration all candidates should submit materials by April 28, 2022 to *MCECISDean@storbecksearch.com*.

## University of Memphis

Visiting Assistant Professor - Data Science

The Department of Computer Science at the University of Memphis is seeking qualified candidates for the position of Visiting Assistant Professor, beginning Fall 2022. This is a one year appointment with possible extension, dependent on need and funds.

The visiting professor will teach undergraduate/graduate courses (primarily Data Science), participate in curriculum development and improvement, and advise students.

Applicants should hold a PhD in computer science or a related field. College level teaching experience is preferred. Research in CS related areas is a plus.

The Department of Computer Science (*www.memphis.edu/cs* )offers BS, MS, and PhD programs, as well as graduate certificates in Data Science and Cybersecurity and Information Assurance. The Department has been ranked 55th in the nation among CS departments with federally funded research.

To apply, please visit *https://workforum.memphis.edu/postings/30739*. Include a

cover letter, curriculum vitae, statement of teaching philosophy, and references. Direct all inquiries to Corinne OConnor (*cconnor2@memphis.edu*).

A background check will be required for employment. The University of Memphis is an Equal Opportunity/Equal Access/ Affirmative Action employer committed to achieving a diverse workforce.

## University of Nebraska at Omaha

*Postdoc and Research Technician Positions in Computer Networks*

The Network Systems Research Laboratory at the University of Nebraska at Omaha has a postdoc position and a research technician position available in the areas of computer networks, network systems, Internet protocols and architecture, and edge computing.

**Link to postdoc application:** *https://unomaha.peopleadmin.com/postings/14940*

**Link to research technician application:** *https://unomaha.peopleadmin.com/postings/15043*

For inquiries, please contact Prof. Spyridon Mastorakis *smastorakis@unomaha.edu*

**For more information about the group's research, please visit:** *https://sites.google.com/site/spyridonmastorakis/*

## University of New Orleans

*Assistant Professor Position*

The Department of Computer Science at the University of New Orleans invites applications for a tenure-track Assistant Professor position starting in Fall 2022 or Spring 2023. Candidates with expertise in gaming, AR/VR, machine learning & AI, and big data are especially encouraged to apply. Preference will be given to candidates whose interests and expertise augment existing strengths and exceptional candidates in any relevant area will be given due consideration.

The department hosts two research centers – the UNO Cyber Center (UNOCC) and the Canizaro Livingston Gulf States Center for Environmental Informatics (GulfSCEI) — and places a strong emphasis on both research and teaching excellence. The city of New Orleans offers a rich and unique cultural experience and opportunities for non-traditional collaborations.

The successful candidate will be expected to offer a broad range of specialized courses in their area of expertise, supervise graduate students, develop a nationally competitive research profile, and secure external research funding.

A Ph.D. in computer science or a closely related field is required for appointment. Successful applicants must possess a record of research excellence and demonstrate strong teaching commitments to graduate and undergraduate courses.

**Interested applicants are invited to submit a resume, three recommendation letters, teaching, research, and diversity statements to:** *https://ulsuno.wd1.myworkdayjobs.com/en-US/UniversityOfNewOrleans/job/New-Orleans-La/Assistant-Professor_R-000187*

Applications will be reviewed on a rolling basis until the positions are filled. UNO is an Equal Employment Opportunity/ Affirmative Action institution committed to excellence through diversity. UNO will not discriminate based upon race, ethnicity, color, sex, religion, national origin, age, disability, genetic information, sexual orientation, gender identity or expression, pregnancy, marital status, military or veteran status, or any other status or classification protected by federal, state, or local law. All eligible candidates are encouraged to apply.

## University of South Dakota

*Visiting Assistant Professor - Computer Science*

The Department of Computer Science at The University of South Dakota invites applications for a Visiting Assistant Professor, to begin August 22, 2022. This is renewable 9-month, full-time, term position.

Apply: *https://yourfuture.sdbor.edu/postings/27707*

Contact: KC Santosh, PhD (Department Chair)

UPSTATE
University of South Carolina

## Assistant Professor of Computer Science

**FAC00078PO22**

The University of South Carolina Upstate is a positive, diverse, and empowering institution for motivated, success-minded students who want to be challenged academically, supported personally, and pushed to the boundaries of their potential in an opportunity-rich environment. Because the University of South Carolina Upstate is proud of its student body, we seek to attract a diverse applicant pool.

The Division of Mathematics and Computer Science at the University of South Carolina Upstate invites applicants to apply for a tenure-track Assistant Professor of Computer Science position with a start date of August 16, 2022, or January 1, 2023. The candidate must have a commitment to excellence in teaching and an established record of research publications. The Division seeks candidates whose expertise will extend and complement existing strengths, but candidates with expertise in cybersecurity, network security, and computer security are strongly encouraged to apply. The division offers degrees in Computer Science, Computer Information Systems, and Cybersecurity. The Computer Science program is accredited by CAC of ABET. USC Upstate has various internal grant opportunities to fund faculty and student research projects. A strong commitment to excellence in undergraduate teaching and advising, along with scholarly activity and service, is expected.

Ph.D. in Computer Science (ABD candidates with planned completion dates by August 15 for an August 16, 2022, start date or by December 31, 2022, for a January 1, 2023, start date are encouraged to apply), a commitment to excellence in teaching and an established record of research publications. A successful background check is required.

For a complete job description and to apply, go to **https://apptrkr.com/2959967**

**Contact information:**
Dr. Chunyu Ai
Division of Math and Computer Science
University of South Carolina
800 University Way, Spartanburg, SC, 29303
Email: aic@uscupstate.edu
Phone: 864-503-5361

*The University of South Carolina does not discriminate in educational or employment opportunities on the basis of race, sex, gender, gender identity, transgender status, age, color, religion, national origin, disability, sexual orientation, genetics, protected veteran status, pregnancy, childbirth or related medical conditions.*

## University of Vermont

*Lecturer in Computer Science*

The College of Engineering and Mathematical Sciences at the University of Vermont (UVM) invites applications for a full-time non-tenure-track lecturer in Computer Science for a Fall 2022 start date. We seek a highly motivated candidate with strong computer science education credentials who can teach a variety of required undergraduate courses including applied programming at introductory and intermediate levels, and web development or other specialty areas that support Department priorities. Minimum Qualifications for this position include an M.S. or similar degree level in computer science or a related field, and a commitment to educating the next generation of computer scientists.

Prior experience teaching undergraduate-level computer science is highly desirable, as is prior experience or willingness to teach in hybrid or online formats, and to teach using active learning and projects-based methods. The successful candidate will be expected to teach a typical course load during each of two semesters per year. A modest amount of service and academic advising is also expected. The appointment period is nine months per year, but opportunities for teaching additional summer courses may be available for additional compensation. UVM offers generous benefits packages, including health, dental, retirement contributions, and tuition remission.

The University of Vermont is an Equal Opportunity/Affirmative Action Employer. All qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, disability, protected veteran status, or any other category legally protected by federal or state law. The University encourages applications from all individuals who will contribute to the diversity and excellence of the institution. Applicants should address how they will further this goal in their cover letter.

# Professional Opportunities

Applications must be submitted online at www.uvmjobs.com (position 014162). Applicants should provide a cover letter that highlights expertise and teaching experience, a diversity statement, a current CV, and the names of three references. A background check will be conducted on the final candidate.

Evaluation of applications will begin May 16, 2022 and continue until the position is filled.

Please address any questions about this position, or the application process, to *Computer.Science@uvm.edu*.

## West Virginia University Institute of Technology

*Assistant Professor of Computer Science*

WVU Institute of Technology invites applications for an Assistant Professor of Computer Science for Fall 2022.

**For more information and to apply visit:**

*https://wvu.taleo.net/careersection/faculty/jobdetail.ftl?job=18808&tz=GMT-05%3A00&tzname=America%2FNew_York*

## Williams College

*One-Year Visiting Position in Computer Science*

The Department of Computer Science at Williams College invites applications for a one-year visiting faculty position beginning in the fall of 2022. Candidates should have a commitment to excellence in teaching and should have a Ph.D., or made significant progress towards completing a Ph.D., in computer science or a closely related discipline by September 2022. Successful candidates will teach a total of four courses with associated labs during the academic year.

The position is open to all areas of computer science. Visiting faculty will join eleven current members of the department in supporting a thriving and diverse undergraduate computer science major. The Department of Computer Science offers a congenial working environment, an excellent student body, and state-of-the-art facilities. Many opportunities exist for collaboration across disciplines, particularly with other faculty in the sciences.

We welcome applications from members of groups traditionally underrepresented in the field. Applications should also include a curriculum vitae, teaching statement, and three letters of reference, at least one of which speaks to the candidate's promise as a teacher. The application materials should also address how the candidate's teaching, scholarship, mentorship and/or community service might support Williams' commitment to diversity and inclusion.

Application materials must be submitted electronically via Interfolio at *http://apply.interfolio.com/103820*.

Materials may be addressed to:

Professor Stephen Freund, Chair
Department of Computer Science
Williams College
Williamstown, MA 01267

Review of applications will begin March 28, and will continue until the position is filled. Please direct all correspondence to *hiring@cs.williams.edu*. All offers of employment are contingent upon completion of a background check. Further information is available at *http://dean-faculty.williams.edu/prospective-faculty/background-check-policy*.

Williams College is a liberal arts institution located in the Berkshire Hills of western Massachusetts. The college has built its reputation on outstanding teaching and scholarship and on the academic excellence of its approximately 2,000 students. Please visit the Williams College website (*http://www.williams.edu*) for more information. Beyond meeting fully its legal obligations for non-discrimination, Williams College is committed to building a diverse and inclusive community where members from all backgrounds can live, learn, and thrive.