

ACM NDC Study:

Second Annual Study of Non-Doctoral-Granting Departments in Computing

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In winter/spring of 2014, ACM conducted its second annual survey of non-doctoral-granting academic departments in computing (NDC). The survey comprises recent degrees, enrollments, faculty demographics and faculty salaries and includes gender and ethnic diversity characteristics of the faculty and of the students in the computing programs. It is designed to complement the Taulbee Survey of doctoral-granting departments in computing conducted by the Computing Research Association [5]. This article reports the results of the NDC survey, with comparisons and contrasts to data reported in the Taulbee Survey and, as appropriate, last year's NDC survey results.

INTRODUCTION

In the winter/spring of 2014, ACM conducted the second annual ACM-NDC Study (a survey of “Non-Doctoral-Granting Departments in Computing”), intended to be an annual complement to the Computing Research Association (CRA) Taulbee Survey of Ph.D.-granting departments in computing [5]. ACM-NDC was conducted with support from ACM, Google, the CRA, AIS [1], and ACM SIGITE [2]. The authors comprised the NDC Steering Committee. As an annual study, NDC helps fill in gaps in data on non-Taulbee programs to present a more complete view of the academic landscape in computing and to expand pipeline information on programs that produce candidates for Ph.D. programs as well as for the private and public labor markets. The timely reporting of the survey’s results provides the community with an early look at workforce-related facts and trends of importance to academic programs and those who rely on them.

The goals of ACM-NDC are to document trends in student enrollment, degree production, faculty demographics and salaries at not-for-profit U.S. academic institutions that grant bachelor’s and/or master’s degrees (but not doctoral degrees) in the five major computing disciplines: computer science (CS), computer engineering (CE), information systems (IS), information technology (IT), and software engineering (SE). Diversity statistics and trends with respect to students and faculty are important features of this documentation.

The NDC was distributed in February 2014 to qualifying programs identified using data in the Integrated Post-secondary Education Data System (IPEDS) [3]. This data is collected annually by the National Center for Education Statistics (NCES) from all U.S. institutions that participate in the federal financial aid programs [4]. This year there were 996 surveys distributed to academic units (departments, schools, or institutions) identified via IPEDS as offering at least one program in computing. In some cases, a single institution received multiple surveys if programs are housed in different schools or departments. Responses were received for 164 academic units (compared to 93 in 2012-13) and data were reported for 364 total programs (302 bachelor’s and 62 master’s), compared to 191 the previous year. We found that 150 out of the 164 responding academic units provided data on faculty (83 in 2012-13) and 135 of those provided faculty salary information (81 in 2012-13). The marked increase in response is very encouraging. We expect the response rate to grow as we continue our ongoing efforts to build awareness and polish the user experience of this fairly demanding survey. The following is a preliminary summary of some key NDC findings.

Since this is only the second year of NDC, data was used primarily for comparisons with Taulbee longitudinal trend analysis is still premature. Furthermore, small response sizes in some parts of the survey make it difficult to draw hard conclusions from the data provided. In reading this report, one should consider the following points.

- › In this report, we use the term “department” to refer to the unit offering the program. We use the term “program” to refer to a course of study leading to a degree in one of the computing disciplines: computer science (CS), computer engineering (CE), information systems (IS), information technology (IT), or software engineering (SE).
- › A given department may offer multiple programs.
- › Degree production (master’s and bachelor’s) refers to the previous academic year (2012-13).
- › Data for current faculty and new students in all categories refer to the current academic year (2013-14).
- › Total enrollment (master’s and bachelor’s) data are reported for both 2012-13 and 2013-14.

BACHELOR’S DEGREE PRODUCTION AND ENROLLMENTS

The Bachelor’s portion of the survey was responded to by 160 institutions, up from 90 last year (Table B1). Bachelor’s degrees in one or more computing disciplines are offered by 156 of those institutions. Three of the other four institutions reported that they have neither bachelor’s nor master’s degrees in computing (presumably, the survey was inappropriate for them), and the fourth reported that they have only a master’s program. In comparison to last year’s respondents, there are greater portions of public (69 of 160 vs. 29 of 90) and Master’s granting (52 of 151 vs. 19 of 84) institutions represented. It should be noted that the Master’s/non-Master’s group is smaller in size than the public/private group when data that categorizes by institution type are presented, since some institutions did not indicate whether or not they have a master’s program in computing (and did not provide any master’s program data).

Table B2 presents the total number of Bachelor’s degree programs by discipline and the percentage of those programs that are ABET accredited. The 302 programs offered represent an 88.8% increase over last year’s number (160). A significantly higher percentage of computer engineering (75.0%) and software engineering (35.3%) programs are accredited than computer science (21.6%), information science (16.7%), or information technology (14.6%) programs. As was evident in last year’s

TABLE B1. SUMMARY OF INSTITUTIONS RESPONDING TO BACHELOR’S SECTION OF SURVEY (based on 160 respondents)

	Overall		Public		Private		Master's		Non-Master's	
	Count	% of Total	Count	% of Total	Count	% of Total	Count	% of Total	Count	% of Total
Yes	156	97.5%	67	97.1%	89	97.8%	51	98.1%	96	97.0%
No	4	2.5%	2	2.9%	2	2.2%	1	1.9%	3	3.0%
Totals	160		69		91		52		99	

TABLE B2. SUMMARY OF PROGRAM OFFERINGS (156 respondents)

	Overall			Public			Private			Master's			Non-Master's		
	Count	% Total	% ABET	Count	% Total	% ABET	Count	% Total	% ABET	Count	% Total	% ABET	Count	% Total	% ABET
CS	171	56.6%	21.6%	66	49.6%	37.9%	105	62.1%	11.4%	65	59.6%	33.8%	97	57.4%	10.3%
CE	12	4.0%	75.0%	7	5.3%	85.7%	5	3.0%	60.0%	7	6.4%	100.0%	5	3.0%	40.0%
IS	54	17.9%	16.7%	21	15.8%	28.6%	33	19.5%	9.1%	13	11.9%	30.8%	34	20.1%	5.9%
IT	48	15.9%	14.6%	31	23.3%	16.1%	17	10.1%	11.8%	17	15.6%	17.6%	25	14.8%	8.0%
SE	17	5.6%	35.3%	8	6.0%	50.0%	9	5.3%	22.2%	7	6.4%	71.4%	8	4.7%	0.0%
Totals	302			133			169			109			169		

data, the percentage of accredited programs at public and Master’s granting institutions is higher than that at private and non-Master’s granting institutions.

In table B3, we report actual degree production in 2011-2012 and 2012-2013 for those departments reporting both years. In these departments, actual degree production in CS increased 12.3% and actual degree production across all disciplines increased 11.4%, in each case with a larger increase in public universities than in private universities. By comparison, the Taulbee survey reported a somewhat lower 9.4% increase in actual degree production across all disciplines when considering only those US CS programs reporting both years. The Taulbee survey does not report the change in CS degree production for US CS departments that reported both years.

Our survey asks respondents to forecast their degree production for 2013-2014. Table B3 also shows this anticipated degree production for 2013-2014, both in all departments reporting this year and in those departments reporting both this year and last year. The departments forecast a double-digit increase in bachelor’s degrees for 2013-2014 (16.2% for CS programs, 12.7% over all programs). Both of these increases are down slightly from those forecast last year (19.8% and 15.7% respectively) and are lower than the corresponding forecast increases by Taulbee bachelor’s programs (22.6% and 19.7% respectively). Interestingly, for those institutions that participated in the survey both years, the anticipated increase in CS degree production is quite a bit higher (27.0%). Anticipated increases for CS degrees were higher at private institutions than public

(17.9% vs. 15.4%), but lower for private schools over all disciplines (10.9% vs. 13.5%). Master’s granting departments report larger anticipated increases than non-Master’s granting (19.4% vs. 12.1% for CS, 20.6% vs. 4.2% overall). There is an exception to this trend in the group of CS programs that reported both years, where the anticipated Non-Master’s increase was higher (26.4% vs. 23.8%).

Table B4 shows a breakdown of bachelor’s degree data by discipline. Actual degree production between 2011-2012 and 2012-2013, among those schools that reported both years, increased by double-digit percentages in SE (29.6%), IT (12.5%) and CS (12.3%), and increased by a more modest 5.4% in CE. IS degree production decreased by 35.7% for these same schools.

When considering anticipated degree production in 2013-2014 by discipline, IS programs reported the largest increase at 20.3%, followed by CS (16.2%) and CE (11.4%). Anticipated IT and SE degree production remained relatively flat (1.9% and 0% increases, respectively). When comparing those programs reporting both years to the overall respondents, larger increases in CS (27.0% vs. 16.2%), IT (4.0% vs. 1.9%), and SE (18.5% vs. 0.0%) programs are anticipated, but significantly smaller increases in CE (6.8% vs. 11.4%) and a marked contrast in IS programs (-77.8% vs. 20.3%). The total number of programs reporting both years in each discipline except CS is small, however, making the significance of the observed differences questionable.

While gender data at NDC schools (Table B5) still compare favorably to Taulbee schools in the percentage of females (15.9%

TABLE B3. DEGREE PRODUCTION AND ANTICIPATED CHANGE BY PROGRAM TYPE

	All Respondents (156 respondents)						Departments Responding Both Years (49 respondents)									
	CS Only			All Disciplines			CS Only					All Disciplines				
	2012-2013 actual	2013-2014 projected	% change	2012-2013 actual	2013-2014 projected	% change	2011-2012 actual	2012-2013 actual	% change	2013-2014 projected	% change	2011-2012 actual	2012-2013 actual	% change	2013-2014 projected	% change
Public	1,345	1,552	15.4%	2,402	2,726	13.5%	337	392	16.3%	484	23.5%	523	611	16.8%	735	20.3%
Private	672	792	17.9%	1,123	1,245	10.9%	273	293	7.3%	386	31.7%	409	427	4.4%	504	18.0%
Master’s	1,034	1,235	19.4%	1,721	2,075	20.6%	NA	416	NA	515	23.8%	NA	636	NA	761	19.7%
Non-Master’s	904	1,013	12.1%	1,556	1,621	4.2%	NA	216	NA	273	26.4%	NA	270	NA	311	15.2%
NDC Overall	2,017	2,344	16.2%	3,525	3,971	12.7%	610	685	12.3%	870	27.0%	932	1,038	11.4%	1,239	19.4%
Taulbee (US CS Depts)	9,449	11,581	22.6%	12,503	14,964	19.7%	NA	NA	NA	NA	NA	10,674	11,679	9.4%	NA	NA

TABLE B4. DEGREE PRODUCTION AND ANTICIPATED CHANGE BY DISCIPLINE

	All Respondents (156 respondents)			Departments Responding Both Years (49 respondents)				
	2012-2013 actual	2013-2014 projected	% change	2011-2012 actual	2012-2013 actual	% change	2013-2014 projected	% change
NDC Overall	3,525	3,971	12.7%	932	1,038	11.4%	1,239	19.4%
CS	2,017	2,344	16.2%	610	685	12.3%	870	27.0%
CE	176	196	11.4%	111	117	5.4%	125	6.8%
IS	419	504	20.3%	28	18	-35.7%	4	-77.8%
IT	741	755	1.9%	112	126	12.5%	131	4.0%
SE	172	172	0.0%	71	92	29.6%	109	18.5%

TABLE B5. BACHELOR'S DEGREES AWARDED BY GENDER, DISCIPLINE AND PROGRAM TYPE (156 respondents)

	Male		Female		Total Known Gender	Gender Unknown	Grand Total
	Count	%	Count	%			
CS Overall	1,662	86.2%	267	13.8%	1,929	88	2,017
CS Public	1,122	88.5%	146	11.5%	1,268	77	1,345
CS Private	540	81.7%	121	18.3%	661	11	672
CS Master's	826	86.5%	129	13.5%	955	79	1,034
CS Non-Master's	771	86.0%	126	14.0%	897	7	904
CS Taulbee	9,116	85.8%	1,511	14.2%	10,627	149	10,776
CE Overall	99	79.8%	25	20.2%	124	52	176
CE Public	78	87.6%	11	12.4%	89	22	111
CE Private	21	60.0%	14	40.0%	35	30	65
CE Master's	72	87.8%	10	12.2%	82	52	134
CE Non-Master's	27	64.3%	15	35.7%	42	0	42
CE Taulbee	1,852	88.4%	243	11.6%	2,095	60	2,155
IS Overall	324	80.4%	79	19.6%	403	16	419
IS Public	210	82.4%	45	17.6%	255	16	271
IS Private	114	77.0%	34	23.0%	148	0	148
IS Master's	87	79.1%	23	20.9%	110	4	114
IS Non-Master's	198	82.2%	43	17.8%	241	12	253
IT Overall	550	80.5%	133	19.5%	683	58	741
IT Public	428	79.9%	108	20.1%	536	58	594
IT Private	122	83.0%	25	17.0%	147	0	147
IT Master's	213	81.9%	47	18.1%	260	54	314
IT Non-Master's	269	81.8%	60	18.2%	329	0	329
SE Overall	115	87.8%	16	12.2%	131	41	172
SE Public	68	84.0%	13	16.0%	81	0	81
SE Private	47	94.0%	3	6.0%	50	41	91
SE Master's	79	94.0%	5	6.0%	84	41	125
SE Non-Master's	19	67.9%	9	32.1%	28	0	28
NDC Overall	2,750	84.1%	520	15.9%	3,270	255	3,525
Taulbee Overall	12,715	85.5%	2,156	14.5%	14,871	216	15,087

vs. 14.5%), the difference is less than reported last year (16.2% vs. 13.3%). Within CE, however, the difference is more significant (20.2% vs. 11.6%). IS and IT programs report higher percentages of females (19.6% and 19.5%) than the overall group, while SE and CS percentages (12.2% and 13.8%) lag behind. For all disciplines except SE, the percentage of females at private institutions is higher than at public schools. CS, CE, and SE programs at non-Master’s schools show higher percentages of females than at Master’s school.

As shown in Table B6, NDC schools report a higher percentage of White/US Resident graduates than do Taulbee institutions (65.8% vs. 60.6%), but also show higher percentages of Hispanic/Latino (9.6% vs. 6.5%) and Black/African-American (7.5% vs. 4.5%) graduates. Fewer NDC than Taulbee graduates are Asian (8.1% vs. 18.8%) or Multi-racial/non-Hispanic (0.7% vs. 1.5%).

Respondents were asked to report the total actual enrollments in each of their bachelor’s programs for both the 2012-2013 and 2013-2014 academic years. As shown in Table B7, the percentage increase in enrollment over all types of schools and programs is 7.2%. This has moderated in comparison to the 11.0% enrollment increase from 2011-2012 to 2012-2013 reported in last year’s NDC survey. Private institutions among this year’s respondents report a higher increase than public (8.1% vs. 6.9%), while Master’s granting schools show a much higher increase than those that do not grant Master’s degrees (9.3% vs. 3.7%).

For those institutions participating in both this year’s and last year’s NDC survey, we have three years’ worth of enrollment data. For these schools, the percentage enrollment increase

reported this year (11.3%) also was less than they reported last year (19.0%). The 19.0% increase between 2011-2012 and 2012-2013 among schools that reported to NDC both years is much higher than the 11.0% reported by all schools who responded to NDC last year, but it is fairly consistent with the 22.0% increase reported by Taulbee schools for whom 2011-2012 and 2012-2013 CS enrollment data was available. Taulbee enrollment data for 2013-2014 is not yet available.

Enrollment by discipline (Table B8) shows increases for the group of overall respondents in CS (7.2%), CE (7.6%), and SE (5.5%). Enrollment in IS showed a decline this year (-3.1%) following lagging growth last year (1.6%). Among those schools participating in both this year’s and last year’s survey, there was a significant increase (35.2%) in IS enrollment; however, the number of schools in this group is small (8). IT enrollment for the overall respondents shows a wide swing, declining by 10.5% this year after a reported growth of 23.9% last year. For those IT programs that reported both years, however, there was an increase in enrollment of 5.1%.

The number of new majors reported over all disciplines and types of institutions (Table B9) is a significant portion of the total number of majors (ranging roughly 25% to 33%). Similar percentages were seen last year for CS and SE, but for the other three disciplines this is a marked change. Taulbee institutions did not report their 2013-2014 total enrollments, but for those Taulbee institutions reporting both years, the 19,549 total new BS majors for 2013-2014 represents a 13.8% increase over the new majors reported in 2012-2013. These results point to pos-

TABLE B6. BACHELOR’S DEGREES AWARDED BY ETHNICITY (156 respondents)

	US Residents							Others				Total
	Hispanic/Latino	American Indian/Alaska Native	Asian	Native Hawaiian/Pacific Islander	Black/African-American	White	2 or more races, non-Hispanic	Non-Resident	Total Ethnicity, Residency Known	U.S. Residency Race Unknown	Residency Unknown	
NDC	267	35	225	27	209	1827	19	166	2775	157	597	3529
	9.6%	1.3%	8.1%	1.0%	7.5%	65.8%	0.7%	6.0%				
Taulbee	6.5%	0.3%	18.8%	0.3%	4.5%	60.6%	1.5%	7.6%	12,005	665	2,417	15,087

TABLE B7. COMPUTER SCIENCE ENROLLMENT CHANGE BY PROGRAM TYPE (156 respondents)

	All Respondents					Departments Responding Both Years							
	2012-2013		2013-2014			2011-2012		2012-2013			2013-2014		
	Headcount	Mean Enroll	Headcount	Mean Enroll	% Increase	Headcount	Mean Enroll	Headcount	Mean Enroll	% increase	Headcount	Mean Enroll	% Increase
Overall	14,157	82.8	15,172	88.7	7.2%	3,975	66.3	4,891	78.9	19.0%	5,442	87.8	11.3%
Public	10,520	159.4	11,242	170.3	6.9%	2,728	170.5	3,349	209.3	22.8%	3,774	235.9	12.7%
Private	3,637	34.6	3,930	37.4	8.1%	1,247	28.3	1,542	33.5	18.4%	1,668	36.3	8.2%
Master’s granting	7,934	122.1	8,671	133.4	9.3%	2,670	140.5	3,102	103.4	-26.4%	3,510	117	13.2%
Non-master’s granting	5,309	54.7	5,507	56.8	3.7%	1,257	33.1	1,112	39.7	19.9%	1,168	41.7	5.0%
CS Taulbee	63,873		NA		NA	49,564		60,453		22.0%	NA		NA

TABLE B8. ACTUAL ENROLLMENT CHANGE FROM PREVIOUS YEAR BY DISCIPLINE

	All Respondents (156 respondents)					Departments Responding Both Years (49 respondents)				
	2012-2013		2013-2014		% Increase	2012-2013		2013-2014		% Increase
	Headcount	Mean Enroll	Headcount	Mean Enroll		Headcount	Mean Enroll	Headcount	Mean Enroll	
CS	14,157	82.8	15,172	88.7	7.2%	4,891	78.9	5,442	87.8	11.3%
CE	1,382	115.2	1,487	123.9	7.6%	674	96.3	765	109.3	13.5%
IS	2,278	42.2	2,208	40.9	-3.1%	88	14.7	119	19.8	35.2%
IT	4,896	102.0	4,384	91.3	-10.5%	687	76.3	722	80.2	5.1%
SE	989	58.2	1,043	61.4	5.5%	597	74.6	611	76.4	2.3%

TABLE B9. 2013-2014 BACHELOR'S ENROLLMENTS BY DISCIPLINE AND PROGRAM TYPE

	All Respondents (156 respondents)				Departments Responding Both Years (49 respondents)			
	Majors	New Majors	# Departments*	Avg. Majors per Dept.	Majors	New Majors	# Departments*	Avg. Majors per Dept.
CS Overall	15,172	4,222	171 (170)	88.7	5,442	1,611	62(61)	87.8
CS Public	11,242	2,928	66 (66)	170.3	3,774	1,057	16(16)	235.9
CS Private	3,930	1,294	105 (104)	37.4	1,668	554	46(45)	36.3
CS Master's	8,671	2,125	65 (65)	133.4	3,510	940	30(30)	117.0
CS Non-Master's	5,507	1,731	97 (96)	56.8	1,168	374	28(27)	41.7
CS Taulbee	63,873	17,348	131	487.6	60,453	16,122	123	491.5
CE Overall	1,487	400	12 (12)	123.9	765	282	7(7)	109.3
CE Public	1,183	314	7 (7)	169.0	540	205	4(4)	135.0
CE Private	304	86	5 (5)	60.8	225	77	3(3)	75.0
CE Master's	1,252	360	7 (7)	178.9	684	255	5(5)	136.8
CE Non-Master's	235	40	5 (5)	47.0	81	27	2(2)	40.5
IS Overall	2,208	548	54 (52)	40.9	119	29	6(6)	19.8
IS Public	1,445	386	21 (21)	68.8	0	0	0(0)	-
IS Private	763	162	33 (31)	23.1	119	29	6(6)	19.8
IS Master's	813	159	13 (13)	62.5	48	13	2(2)	24.0
IS Non-Master's	1,039	298	34 (33)	30.6	71	19	4(4)	17.8
IT Overall	4,384	1,231	48 (46)	91.3	722	180	9(9)	80.2
IT Public	2,983	799	31 (29)	96.2	623	152	4(4)	155.8
IT Private	1,401	432	17 (17)	82.4	99	28	5(5)	19.8
IT Master's	1,721	407	17 (17)	101.2	162	50	4(4)	40.5
IT Non-Master's	1,867	566	25 (23)	74.7	108	19	4(4)	27.0
SE Overall	1,043	343	17 (15)	61.4	611	212	8(7)	76.4
SE Public	558	181	8 (7)	69.8	400	140	4(4)	100.0
SE Private	485	162	9 (8)	53.9	211	72	4(3)	52.8
SE Master's	649	211	7 (6)	92.7	432	140	5(4)	86.4
SE Non-Master's	221	67	8 (7)	27.6	33	12	2(2)	16.5
NDC Overall	24,294	6,744	302 (295)	80.4	7,659	2,314	88(87)	87.0
Taulbee	NA	21,626	(152)	NA	NA	19,549	(146)	NA

*Numbers in parentheses are departments reporting new major information

sible growth in degree production for all disciplines in the coming years.

As was the case last year, the average number of majors per department in NDC schools is much lower than in Taulbee schools over all disciplines and even more so in CS. Consistent with last year's findings, the average number of majors per department in all disciplines is much higher at public vs. private and Master's vs. non-Master's institutions.

MASTER'S DEGREE PRODUCTION AND ENROLLMENTS

We found that 51 institutions provided data on 62 master's programs in computing. Of the 51 institutions, 30 were public and 21 private (Tables M1-M2). Another 58 programs responded to the master's section, only to say that they did not have a master's program in computing. The small number of participating institutions, students and programs, especially when consid-

TABLE M1. SUMMARY OF INSTITUTIONS RESPONDING TO MASTER'S SECTION OF SURVEY (51 respondents)

	Overall		Public		Private	
	Count	% of Total	Count	% of Total	Count	% of Total
Yes	51	46.8%	30	60.0%	21	35.6%
No	58	53.2%	20	40.0%	38	64.4%
Totals	109		50		59	

TABLE M2. SUMMARY OF PROGRAM OFFERINGS (51 respondents)

	Overall		Public		Private	
	Count	% Total	Count	% Total	Count	% Total
CS	33	53.2%	25	64.1%	8	34.8%
CE	3	4.8%	2	5.1%	1	4.3%
IS	7	11.3%	5	12.8%	2	8.7%
IT	9	14.5%	4	10.3%	5	21.7%
SE	10	16.1%	3	7.7%	7	30.4%
Totals	62		39		23	

ered on a discipline-specific basis, should be taken into account when drawing any conclusions from the data presented here. Furthermore, the small number of master's programs that provided data to the survey in both years (fewer than 20 across all of the disciplines) precludes our providing comparative data for schools that responded in both years.

Those institutions responding to this year's survey anticipate an overall 12.9% increase in the production of master's degrees in 2013-2014 over those granted in 2012-2013 (Table M3). CS programs anticipate a 27.3% increase and IT programs a 9% increase, while SE anticipate a decrease of 12.7% and IS a decrease of 2.8%. In comparison, Taulbee schools reported an anticipated decrease in overall master's production for 2013-14 of 4.6% and a decrease in CS of 2.6%. Combining IS and IT ("I"), NDC showed a 4% anticipated increase in degree production, compared to a 13.7% anticipated decrease for "I" programs responding to Taulbee.

TABLE M3. DEGREE PRODUCTION CHANGE BY DISCIPLINE (51 respondents)

	2012-2013 actual	2012-2013 Per Program	2013-2014 projected	2013-2014 Per Program	% change
NDC Overall	939	16.8	1060	17.7	12.9%
CS	490	15.8	624	19.5	27.3%
CE	15	15.0	15	7.5	0.0%
IS	109	18.2	106	15.1	-2.8%
IT	144	16.0	157	17.4	9.0%
SE	181	20.1	158	15.8	-12.7%

Among the 2012-13 master's degree graduates, 24.5% were female (Table M4), slightly less than the 27.3% at Taulbee schools. CS, the discipline with the largest response size, reported 28.6% female graduates, higher than the 21.2% reported by Taulbee CS master's programs. Taulbee's "I" programs reported that 47.1% of their master's degrees went to females compared to 23.7% of IS and IT master's degrees at NDC programs.

A comparison of ethnicity data between NDC and Taulbee schools (Table M5) shows that NDC schools had a higher percentage of Hispanic/Latino US resident graduates (6.1% vs. 1.8%), black/African-American resident graduates (4.9% vs. 2.0%), and white graduates (38% vs. 28.9%). There were fewer non-resident graduates (40.3% vs. 57.1%), while the number of Asian resident graduates was similar (9.4% for NDC and 9% for Taulbee). It's useful to note that only 13% of total Taulbee graduates were marked as residents of unknown ethnicity or students of unknown residency. For NDC, the number is 30.6%, which may suggest that gathering ethnicity/residency data is a challenge at NDC programs.

Overall enrollment at NDC master's programs increased 13.5% from 2012-13 to 2013-14 (Table M6). There were significant increases in CS (28.2%) and IT (18.4%), as well as a 3.5% increase in SE. CE, with a very small number of programs reporting, showed 32.6% growth. Among NDC IS programs, there was a 4.2% decline in enrollment.

FACULTY DEMOGRAPHICS

On average, the departments responding this year report a faculty size of 10.2, accounting for an average of 8.0 FTE (Table F1). This is somewhat larger than the average of 8.1 (6.5 FTE) reported last year. The difference is accounted for by the larger average number of full-time non-tenure-track faculty (1.1 vs. 0.7 last year) and part-time/adjunct faculty (4.2 vs. 2.2 last year). Private universities and departments having no master's programs tend to have a somewhat greater percentage of tenure-track faculty and visiting faculty, but a smaller percentage of part-time/adjunct faculty, than do public universities and departments having master's programs.

Full professors and associate professors account for about the same fraction of the total tenure-track faculty members (a little more than 1/3 each), while assistant professors make up about a quarter of the total faculty (Table F2). This is similar to last year's observations. Also as reported last year, these percentages don't vary much between public and private universities, nor between departments having master's programs and those not having master's programs.

Table F3 shows the breakdown of tenure-track faculty members by gender. The percentage of female faculty is similar to that reported last year at each rank. Note that the more junior the faculty rank, the greater the percentage who are women. Also note that at each rank, the percentage of tenure-track faculty members who are women exceeds its counterpart among doctoral granting computing departments as reported in the Taulbee Survey. The percentage of women among assistant

TABLE M4. MASTER'S DEGREES AWARDED BY GENDER, DISCIPLINE AND PROGRAM TYPE (51 respondents)

	Male		Female		Total Known Gender	Gender Unknown	Grand Total
CS Overall	215	71.4%	86	28.6%	301	189	490
CS Public	152	69.7%	66	30.3%	218	189	407
CS Private	63	75.9%	20	24.1%	83	0	83
CS <i>Taulbee</i>	5,629	78.8%	1,518	21.2%	7,147	58	7,205
CE Overall	0	0.0%	0	0.0%	0	15	15
CE Public	0	0.0%	0	0.0%	0	15	15
CE Private	0	0.0%	0	0.0%	0	0	0
CE <i>Taulbee</i>	543	75.6%	175	24.4%	718	24	742
IS Overall	78	71.5%	31	28.5%	109	0	109
IS Public	28	63.6%	16	36.4%	44	0	44
IS Private	50	76.9%	15	23.1%	65	0	65
IT Overall	102	80.3%	25	19.7%	127	17	144
IT Public	20	66.7%	10	33.3%	30	17	47
IT Private	82	84.5%	15	15.5%	97	0	97
IT <i>Taulbee</i>	1,226	52.9%	1,092	47.1%	2,318	61	2,379
SE Overall	146	81.5%	33	18.5%	179	2	181
SE Public	63	82.9%	13	17.1%	76	2	78
SE Private	83	80.6%	20	19.4%	103	0	103
NDC Overall	541	75.5%	175	24.5%	716	223	891
<i>Taulbee Overall</i>	7,398	72.7%	2,785	27.3%	10,183	143	10,326

TABLE M5. MASTER'S DEGREES AWARDED BY ETHNICITY (51 respondents)

	US Residents							Others				Total
	Hispanic/Latino	American Indian/Alaska Native	Asian	Native Hawaiian/Pacific Islander	Black/African-American	White	2 or more races, non-Hispanic	Non-Resident	Total Ethnicity, Residency Known	U.S. Residency Race Unknown	Residency Unknown	
NDC	40	1	61	1	32	248	6	263	652	38	249	939
	6.1%	0.2%	9.4%	0.2%	4.9%	38.0%	0.9%	40.3%				
<i>Taulbee</i>	165	16	808	8	178	2,592	89	5,127	8,983	464	879	10,326
	1.8%	0.2%	9.0%	0.1%	2.0%	28.9%	1.0%	57.1%				

TABLE M6. ACTUAL ENROLLMENT CHANGE FROM PREVIOUS YEAR BY DISCIPLINE (51 respondents)

	2012-2013		2013-2014		% Increase
	Headcount	Mean Enroll	Headcount	Mean Enroll	
CS	1,723	52.2	2,209	66.9	28.2%
CE	40	13.3	53	17.7	32.6%
IS	284	40.6	272	38.9	-4.2%
IT	915	101.7	1,083	120.3	18.4%
SE	791	79.1	819	81.9	3.5%
NDC Total	3,753	57.4	4,436	65.1	13.5%

TABLE F1. ACTUAL FACULTY SIZE 2013-14 (149 respondents)

Faculty Type	Overall Avg HC	Overall % of HC Total	Overall Avg FTE	Overall % of FTE Total	Public FTE	Private FTE	UG only FTE	UG+grad FTE
# respondents	149		149		60	89	98	50
Tenure-track	4.7	67.3%	4.6	74.6%	71.6%	76.6%	76.7%	70.6%
Visiting	0.2	2.0%	0.1	2.1%	1.2%	2.6%	2.5%	1.0%
FT Non-TT	1.1	13.1%	1.1	13.9%	15.4%	12.9%	13.9%	13.8%
PT/Adjunct	4.2	17.6%	2.2	9.5%	11.9%	7.9%	6.9%	14.5%
Total	10.2		8.0					

TABLE F2. TENURE-TRACK FACULTY HEADCOUNT BREAKDOWN BY RANK (139 respondents)

Faculty Type	Overall	Overall %	Public	Private	UG only	UG+grad
# respondents	139	139	58	81	90	48
	Tot Avg					
Full Professor	251 1.8	35.8%	35.4%	36.2%	34.4%	37.3%
Associate Professor	251 1.8	35.8%	36.2%	35.2%	34.4%	37.0%
Assistant Professor	184 1.3	26.2%	27.4%	24.7%	26.4%	25.7%
Other	16 0.1	2.3%	1.0%	3.9%	4.9%	0.0%

TABLE F3. TENURE-TRACK FACULTY HEADCOUNT BREAKDOWN BY GENDER (139 respondents)

Gender	Full Prof	Assoc Prof	Asst Prof	Other T-T	Overall T-T
Total faculty	251	251	184	16	702
Male	79.7%	76.5%	66.8%	100.0%	75.6%
Female	19.5%	21.9%	29.3%	0.0%	22.5%
Not reported	0.8%	1.6%	3.8%	0.0%	1.9%
percent female *	19.7%	22.3%	30.5%	0.0%	22.9%
2013 Taulbee % female*	13.5%	19.8%	26.3%	n/a	17.9%

* as a percentage of those for whom gender was reported

professors (who comprise most of the newly hired faculty) at the reporting NDC departments (29.3%) again exceeds both the percentage of female students graduating from bachelor’s programs in these departments (15.9%) and the percentage of female graduates from their master’s programs (24.5%).

Table F4 shows the breakdown of tenure-track faculty members by ethnicity. White and Asian ethnicities account for more than 3/4 of the total faculty members at senior ranks and more than 2/3 of the total assistant professors. Collectively, the underrepresented minority categories of African-American, American Indian/Alaska Native, Native Hawaiian/Pacific Islander, Hispanic/Latino, and Multiracial account for only 7.7% of the total faculty whose residency is known. However, this is better than the 5.3% reported by the Taulbee Survey for doctoral-granting computing departments. Again this year, the percentage of assistant professors from these underrepresented minority categories is lower than the percentage of master’s graduates in these categories from the NDC departments (12.3%), and much lower than the percentage of graduates from their bachelor’s programs in these categories (20.1%).

Table F5 summarizes faculty recruiting at this year’s 150 responding departments. On average, there were 0.41 tenure-track openings per department, or two tenure-track openings for about every five schools during the 2012-13 recruiting year (though some schools had more than one opening). This is less than the 0.48 openings per department reported last year. Of these, 80% were filled, similar to last year’s 83% success rate. As expected, the vast majority of the new tenure-track positions again were at the assistant professor level. Only 22.9% of the newly hired faculty were women, compared to last year’s 30.3%, and 4.2% were from underrepresented minority ethnicities (Table F6). This year, the departments in the NDC survey did about the same at recruiting women but not as well at recruiting underrepresented minorities than did their counterpart doctoral-granting departments reporting to the Taulbee Survey. However, the small number (49) of tenure-track faculty recruited by the reporting NDC departments makes it inappropriate to draw any strong conclusions.

Table F7 summarizes the degrees required for hiring new faculty members at each rank, and for promotion and tenure decisions. Doctoral degrees are almost universally required for

TABLE F4. TENURE-TRACK FACULTY HEADCOUNT BREAKDOWN BY ETHNICITY (139 respondents)

Ethnicity	Full Prof	Assoc Prof	Asst Prof	Other T-T	Overall T-T
Total faculty	251	251	184	16	702
Nonresident Alien	0.0%	0.4%	7.1%	0.0%	2.0%
American Indian/Alaska Native	0.0%	0.4%	0.0%	0.0%	0.1%
Asian	16.7%	24.6%	20.7%	12.5%	20.5%
Black or African-American	0.4%	2.0%	2.7%	0.0%	1.6%
Native Hawaiian/Pacific Islander	0.0%	0.4%	0.0%	0.0%	0.1%
White	69.7%	55.6%	47.8%	81.3%	59.2%
Multiracial, not Hispanic/Latino	3.6%	2.0%	2.2%	0.0%	2.6%
Hispanic/Latino, any race	2.0%	3.2%	3.3%	6.3%	2.8%
Resident, race/ethnicity unknown	5.2%	4.8%	7.1%	0.0%	5.4%
Total Residency known	97.6%	93.3%	90.8%	100.0%	94.3%
Residency unknown	2.4%	6.7%	9.2%	0.0%	5.7%
Black+Hisp_NatAm+NatHaw+Multi*	6.1%	8.5%	9.0%	6.3%	7.7%
2013 Taulbee Survey*	3.7%	6.5%	7.2%	n/a	5.3%

* as a percentage of those for whom residency is known

TABLE F5. FACULTY RECRUITING DURING 2012-13 (150 RESPONDENTS)

Faculty Type	Number Sought	Avg/Dept	Number Filled	Success Rate
Tenure-track	61	0.41	49	80%
Full Professor			4	
Associate Professor			9	
Assistant Professor			35	
Other			1	
Visiting	19	0.13	14	74%
FT Non-TT	31	0.21	23	74%
PT/Adjunct	145	0.97	120	83%

hiring at the associate or full professor rank. This is similar to last year, though we have a much greater sample of departments this year. The requirement for the doctoral degree is somewhat stronger in public universities and in departments that have master’s programs. At the assistant professor rank, over 75% of the responding departments required the doctoral degree, with public universities and departments with master’s degrees placing a much greater emphasis on the doctoral degree. For full-time non-tenure-track positions, the master’s degree is the predominant requirement no matter the type of university or existence of a master’s program. As was the case last year, requirements for promotion and tenure also were almost universally the doctorate, though again there were instances where a school had a slightly weaker requirement for promotion to the rank than they had for hiring into that rank.

The 150 responding departments reported a total of 44 tenure-track faculty departures during the past academic year (Table F8). That represents an attrition rate of 6.3% of their to-

TABLE F6. GENDER AND ETHNICITY OF NEWLY HIRED FACULTY (149 respondents)

Gender	Ten-Track
Male	70.8%
Female	22.9%
Unknown	6.3%
2013 Taulbee Survey*	22.5%
Ethnicity	Ten-Track
Nonresident Alien	12.5%
American Indian/Alaska Native	0.0%
Asian	18.8%
Black or African-American	2.1%
Native Hawaiian/Pacific Islander	0.0%
White	54.2%
Multiracial, not Hispanic/Latino	0.0%
Hispanic/Latino, any race	2.1%
Resident, race/ethnicity unknown	2.1%
Total Residency known	91.7%
Residency unknown	8.3%
Black+Hisp_NatAm+NatHaw+Multi**	4.9%
2013 Taulbee Survey**	6.2%

* percent female among those for whom gender was reported

** as a percentage of those for whom residency is known

tal tenure-track faculty, slightly less than last year. The top three reasons for departures were retirement, leaving for another academic position, and leaving for a non-academic position. The Taulbee Survey also had the same three top reasons. However, the Taulbee faculty were more likely to leave for another academic position than were NDC faculty.

TABLE F7. DEGREE REQUIRED FOR FACULTY PERSONNEL DECISIONS (150 respondents)

Required degree	Hiring Full Prof	Hiring Assoc Prof	Hiring Asst Prof	Hiring FT Non-TT	Tenure	Promotion to Full Prof	Promotion to Assoc Prof
Overall (150 departments)							
Doctoral	93.3%	88.7%	75.3%	16.7%	85.3%	95.3%	83.3%
Masters	6.7%	11.3%	24.0%	80.0%	14.7%	4.7%	16.7%
Bachelors	0.0%	0.0%	0.7%	3.3%	0.0%	0.0%	0.0%
Public (61 departments)							
Doctoral	96.7%	96.7%	91.8%	9.8%	91.8%	96.7%	93.4%
Masters	3.3%	3.3%	8.2%	85.2%	8.2%	3.3%	6.6%
Bachelors	0.0%	0.0%	0.0%	4.9%	0.0%	0.0%	0.0%
Private (89 departments)							
Doctoral	91.0%	83.1%	64.0%	21.3%	80.9%	94.4%	76.4%
Masters	9.0%	16.9%	34.8%	76.4%	19.1%	5.6%	23.6%
Bachelors	0.0%	0.0%	1.1%	2.2%	0.0%	0.0%	0.0%
UG only (98 departments)							
Doctoral	89.8%	84.7%	66.3%	18.4%	80.6%	92.9%	78.6%
Masters	10.2%	15.3%	32.7%	76.5%	19.4%	7.1%	21.4%
Bachelors	0.0%	0.0%	1.0%	5.1%	0.0%	0.0%	0.0%
UG and Master's (51 departments)							
Doctoral	100.0%	96.1%	92.2%	13.7%	94.1%	100.0%	92.2%
Masters	0.0%	3.9%	7.8%	86.3%	5.9%	0.0%	7.8%
Bachelors	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

TABLE F8. TENURE-TRACK FACULTY DEPARTURES (83 respondents)

	NDC	Taulbee
Responding departments	83	
Total number of departures	29	221
Reason for Departure (percent)		
Retired	39.5%	40.3%
Deceased	0.0%	4.1%
Other ac position	15.8%	28.1%
Non-ac position	29.0%	12.2%
Changed to PT	0.0%	5.0%
Other reason	10.5%	8.6%
Reason unknown	5.3%	1.8%

FACULTY SALARIES

This year, ninety-eight of the responding departments reported individual salaries for their tenure-track and full-time non-tenured-track faculty members. Another thirty-seven departments reported only aggregate salaries for their faculty at the different faculty ranks.

Table F9 shows the median salaries by faculty rank among the faculty in those departments that reported individual salaries. Median salaries at the public universities exceed those at the private universities at the assistant and full professor ranks, but public and private universities had comparable medians for

associate professors and full-time non-tenure-track faculty. Median salaries at departments that have master's programs exceed those at departments that do not have master's programs, for all tenure-track ranks and for full-time non-tenure-track faculty.

Table F10 shows the corresponding information for departments that reported aggregate salaries. The salary entries are the averages of the various median salaries at each rank as reported by these departments, so these are not true median salaries nor true average salaries. Among these programs, these median averages for assistant professors were higher at private departments than at public departments, and were higher for those departments that did not have master's programs than for those that did have master's programs. These comparisons are in the reverse direction than reported above for the departments that provided individual salaries.

CONCLUSION

The data gathered in this year's NDC reflects continued positive trends in enrollment and degree production that extend beyond Taulbee institutions to the hundreds of schools surveyed by ACM-NDC. In addition to valuable pipeline data, NDC also gives the computing education community a previously unavailable snapshot of the students and faculty at these institutions, which annually produce thousands of graduates in the computing disciplines.

If your program participated in the 2013-2014 ACM-NDC study, thank you for your help. The 2014-2015 survey will go

TABLE F9. MEDIAN FACULTY SALARIES (FROM INDIVIDUAL SALARY DATA)

	Overall	Public	Private	UG only	UG+Grad
Departments responding	98	45	53	63	35
Full Professor					
Number of individual faculty	193	103	90	95	98
Median Salary	\$95,460	\$99,295	\$90,700	\$92,000	\$102,000
Associate Professor					
Number of individual faculty	207	111	96	104	103
Median Salary	\$87,765	\$88,250	\$87,630	\$78,900	\$92,000
Assistant Professor					
Number of individual faculty	160	95	65	83	77
Median Salary	\$73,677	\$75,000	\$71,600	\$70,000	\$76,318
Full-time non-tenure track faculty					
Number of individual faculty	155	106	49	75	80
Median Salary	\$55,000	\$55,000	\$56,000	\$52,500	\$56,260

TABLE F10. FACULTY SALARIES (FROM AGGREGATE SALARY DATA)

	Overall	Public	Private	UG only	UG+Grad
Departments responding	37	12	25	23	14
Full Professor					
Departments responding	26	10	16	15	11
Average of Median Salary	\$85,862	\$87,575	\$84,792	\$85,498	\$86,358
Associate Professor					
Departments responding	23	8	15	13	10
Average of Median Salary	\$72,567	\$73,003	\$72,334	\$71,364	\$74,131
Assistant Professor					
Departments responding	23	8	15	11	12
Average of Median Salary	\$66,400	\$63,676	\$67,958	\$70,273	\$63,173
Full-time non-tenure track faculty					
Departments responding	17	7	10	8	9
Average of Median Salary	\$54,789	\$56,300	\$53,727	\$57,115	\$52,717

out to qualifying programs in the fall of 2014 or winter of 2015. We would love to hear from you about how the survey can be improved, and look forward to your continued, annual participation. If you are at a qualifying program but were not able to participate, or were never contacted, we want to hear from you as well. Please send all comments and queries to Yan Timanovsky, ACM Education Manager at yan.timanovsky@acm.org. **Ir**

List of All 224 ACM-NDC Participating Institutions

Abilene Christian University, Adams State College, Alabama A&M University, Albright College, Aquinas College, Athens State University, Augsburg College, Austin Peay State University, Baldwin-Wallace College, Beacon College, Belmont University, Beloit College, Benedictine College, Biola University, Blackburn College, Bluefield State College, Boise State University, Briar Cliff University, Bridgewater College, Bridgewater State University,

Brigham Young University-Hawaii, Brigham Young University-Idaho, Bryn Mawr College, Cabrini College, California State University, Fullerton, California State University, Long Beach, California State University-Chico, California State University-East Bay, California State University-Stanislaus, Calvin College, Capital University, Carroll College, Carroll University, Carthage College, Central College, Chestnut Hill College, Citadel Military College of South Carolina, Clarke University, Clayton State University, Coker College, College of Saint Benedict, College of the Holy Cross, College of the Ozarks, Columbus State University, Covenant College, Delaware State University, DePauw University, Dickinson College, Dillard University, Doane College, Eastern Mennonite University, Eastern Washington University, Embry Riddle Aeronautical University-Prescott, Fairleigh Dickinson University-College at Florham, Faulkner University, Fitchburg State University, Florida Memorial University, Fordham University, Framingham State University, Francis Marion University, Franklin W. Olin

College of Engineering, Freed-Hardeman University, Georgia College & State University, Georgia Gwinnett College, Georgia Southern University, Georgian Court University, Grace University, Great Basin College, Greenville College, Grinnell College, Grove City College, Gustavus Adolphus College, Hannibal-Lagrange College, Harrisburg University of Science and Technology, Harvey Mudd College, Hastings College, Heidelberg University, Henderson State University, Hendrix College, Hiram College, Howard Payne University, Howard University, Humboldt State University, Huntington University, Illinois Wesleyan University, Indiana State University, Indiana University-Purdue University Indianapolis, Jacksonville State University, Johnson C. Smith University, Kean University, Kennesaw State University, King's College, Knox College, Lafayette College, Le Moyne College, LeTourneau University, Lewis University, Longwood University, Louisiana College, Loyola University Maryland, Marymount University, Massachusetts College of Liberal Arts, McNeese State University, Merrimack College, Metropolitan State College of Denver, Metropolitan State University, Miami University, Millersville University of Pennsylvania, Milligan College, Milwaukee School of Engineering, Minnesota State University, Mankato, Missouri State University, Montana Tech of the University of Montana, Morehead State University, Mount Holyoke College, Nebraska Wesleyan University, Northern Arizona University, Northern Kentucky University, Northern Michigan University, Northern New Mexico College, Northwest Nazarene University, Norwich University, Oglala Lakota College, Olivet Nazarene University, Otterbein University, Ouachita Baptist University, Pacific Union College, Park University, Pennsylvania State University-Penn State Dubois, Pennsylvania State University-Penn State Erie-Behrend College, Pennsylvania State University-Penn State Schuylkill, Pfeiffer University, Philander Smith College, Providence College, Ramapo College of New Jersey, Regis University, Roberts Wesleyan College, Rocky Mountain College, Rose-Hulman Institute of Technology, Rust College, Saint Catharine College, Saint Vincent College, Salisbury University, Sarah Lawrence College, Seattle University, Shepherd University, Siena College, Silver Lake College, Simpson College, Slippery Rock University, Smith College, Southern Adventist University, Southern Connecticut State University, Southern Oregon University, Southern Polytechnic State University, Southern Wesleyan University, Southwestern University, Spring Arbor University, St. Cloud State University, St. Olaf College, State University of New York at Brockport, Stephen F. Austin State University, Stevens Institute of Technology, SUNY at Fredonia, SUNY College at Oswego, SUNY College of Technology at Canton, Texas A&M University - Corpus Christi, The College of St. Scholastica, The College of Wooster, The University of Alabama in Huntsville, The University of Michigan - Dearborn, The University of Tennessee-Martin, The University of Texas at Brownsville & Texas Southmost College, The University of Texas-Pan American, Thiel College, Trinity University, Union College, United States Naval Academy, University of Missouri-St. Louis, University of Central Missouri, University of Central Oklahoma, University of Detroit Mercy, University of Hartford, University of Hawai'i at Hilo, University

of Houston, College of Technology, University of Louisiana at Monroe, University of Maine at Farmington, University of Mount Union, University of North Alabama, University of North Carolina at Greensboro, University of North Carolina at Pembroke, University of North Carolina Wilmington, University of Portland, University of Scranton, University of South Florida Sarasota-Manatee, University of the District of Columbia, University of Washington Tacoma, University of Washington-Bothell Campus, University of West Georgia, University of Wisconsin - Eau Claire, University of Wisconsin-Green Bay, University of Wisconsin-Parkside, University of Wisconsin-Platteville, University of Wisconsin-Stevens Point, University of Wisconsin-Stout, University of Wisconsin-Whitewater, Ursinus College, Valparaiso University, Vassar College, Villanova University, Walla Walla University, Wartburg College, Wayne State College, Weber State University, Western Kentucky University, Western New England University, Western State College of Colorado, Westminster College, Wheaton College (MA), William Paterson University of New Jersey, Williams Baptist College, Wisconsin Lutheran College, Wofford College.

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