ACS Chemistry for Life™

Starting Salaries of Chemists And Chemical Engineers: 2015

Analysis of the American Chemical Society's Survey Of New Graduates in Chemistry and Chemical Engineering

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Data Based Insights, Inc. on behalf of the
ACS Department of Research & Product Development

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American Chemical Society

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Available from the Department of Research and Product Development

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For more than four decades, the American Chemical Society has prepared an annual survey of new graduates. This year, under the direction of the ACS Committee on Economic and Professional Affairs' Subcommittee on Surveys, the ACS conducted a survey to determine trends in starting salaries and the employment status of chemists and chemical engineers. This report presents the detailed results of the 2015 survey of new graduates.

The survey was conducted and managed by Gareth Edwards, Senior Research Associate and Brittany Vesce-Rubenic, Research Associate, in the ACS's Department of Research and Product Development. Andrew Bell of Intelliscan, Inc. directed the data collection. Steve and Clint Marchant of Data Based Insights, Inc. (an affiliate of Intelliscan) analyzed the results of the survey and prepared this report.

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SUMMARY AND COMMENTS

The *Starting Salaries of Chemists and Chemical Engineers: 2015* report examines new graduates from July 2014 to June 2015 and documents the starting salaries for those who obtained a full-time job by the first Monday in October (October 5, 2015). The report discusses median and mean starting salaries among those with less than 12 months of work experience, and summarizes how salaries have changed over time. It presents current findings on salary ranges, employment sectors, and salaries between genders. It assesses the proportion of graduates that are going on to advanced studies. It covers employment status, unemployment and job satisfaction.

- Overall, the 2015 starting salary for new graduates was comparable to or above salaries in 2014.
- The median full-time starting salary for inexperienced new graduates is $42,000, the same as 2014. However, a low 0.2% annual inflation rate (October 2014 to October 2015), suggests that the median salary for chemists and chemical engineers as a whole maintained value from 2014 to 2015. (Table 1a)
- By degree, newly graduated bachelor's earned $40,000, master's $50,000 and PhD's $75,000. (Table 1a)
- Median starting salary for new chemistry PhDs increased from $60,000 in 2014 to $72,000 in 2015, a difference of 20.0%. This was a bounce back year for new chemistry PhD starting salary. The 2015 median salary figure is more congruent with 2013 and the years prior. (Table 1b).
- Among chemical engineering graduates, median salary increased +2.1 over 2014. However, among those that earned a bachelor's degree, starting median salary declined -1.9%. (Table 1c).
- The employment sector with the highest starting salary for new chemistry graduates was government with a median salary of $40,900. However, it was the smallest employment sector among new graduates--7% of chemistry graduates had taken a job in the sector. A 5 year period was used to increase the sample size for stability. (Table 5b)
- Across all degrees, male and female new chemistry graduates had a salary differential of -1.3%. Males had the higher salary. However, among all new chemical engineering graduates, females earned a median starting salary +6.6% higher than males. (Table 7)
- The unemployment rate for new graduates (chemistry and chemical engineering combined) was 13.1% for 2015, slightly higher than the 12.4% in 2014. The 2015 unemployment rate was consistent with the rate over the past five-years. (Figures 4 & 5)

STARTING SALARIES

MEDIAN STARTING SALARIES

Median Salaries for all New Graduates: In 2015, newly graduated chemists and chemical engineers who had less than 12-months work experience earned a median full-time salary of $42,000. The median salary among all new graduates is the same as it was in 2014. *(Please note: All salary figures are rounded to the nearest $100).*

The Consumer Price Index (CPI) indicates that the rate of inflation between October 2014 and October 2015 was 0.2%. As a result, the median full-time salary for an inexperienced new graduate effectively lost -0.2% in value, relative to the pace of inflation.

The *Constant Dollars* calculations below are based on the CPI, which measures the change in the price of a constant basket of consumer goods and services over time.

Table 1a. Median Full-Time Permanent Starting Salaries for **Inexperienced** New Graduates

(Chemistry & Chemical Engineering Graduates Combined 2014-2015)

	Median Salary in Current Dollars		% Change from 2014	
	2014	2015	Current Dollars	Constant Dollars*
All New Grads	$42,000	$42,000	+0.0%	-0.2%
Bachelor's	40,000	40,000	+0.0%	-0.2%
Master's	52,000	50,000	-3.8%	-4.0%
Doctorate	62,900	75,000	+19.2%	+19.0%

* Rate of inflation = 0.2%

Table 1a compares median salary from 2014 to 2015 among inexperienced new graduates by degree:

- **Bachelor:** New bachelor's degree holders have a median salary of $40,000 in both 2014 and 2015.
- **Master:** New master's degree holders report a -3.8% loss in salary compared with last year.
- **Doctorate:** The median PhD salary bounced back +19.2% from the dip in median salary that occurred in the 2014 survey. The median salary of $75,000 among new PhDs in 2015 was similar to the 2013 PhD median salary of $75,300.

Note: Salary data is based on new graduates as of May-June 2014 and 2015 who had obtained full-time permanent employment by the first week of October the same year.

Median Salaries for Chemistry Graduates: Among inexperienced chemistry graduates (excluding chemical engineers), median full-time salary remained at $40,000 in 2015. The low 0.2% rate of inflation did not substantially impact the value of a new chemists' starting salary from 2014 to 2015.

Table 1b. Median Full-Time Starting Salaries for **Inexperienced Chemistry** Graduates (2014-2015)

	Median Salary in Current Dollars		% Change from 2014	
	2014	2015	Current Dollars	Constant Dollars*
All Chemists	$40,000	$40,000	+0.0%	-0.2%
Bachelor's	36,900	38,000	+3.0%	+2.8%
Master's	52,000	n.a.	--	--
Doctorate	60,000	72,000	+20.0%	+19.8%

* Rate of inflation = 0.2%
Cells with fewer than 15 cases not available and indicated with "n.a."

Table 1b reviews comparison salaries for inexperienced new chemistry graduates between 2014 and 2015:

- **Bachelor:** Starting median salary among new chemistry graduates with a bachelor's degree increased from $36,900 in 2014 to $38,000 in 2015, +3.0% in current dollars. This is the second consecutive increase in median starting salary among new bachelor's chemists (see Table 3b).
- **Masters:** With fewer than 15 respondents, salary information among inexperienced master's chemistry graduates is not available.
- **Doctorate:** Among new chemistry PhD graduates, median starting salary was $72,000 in 2015. It was a bounce-back year (+20.0% in current dollars) for the new PhD median starting salary, following a nearly equal decline in 2014.

Median Salaries for Inexperienced Chemical Engineering Graduates: The starting median salary among new chemical engineering graduates was $69,200 for 2015. When adjusted for inflation, this is a +1.9% increase over the 2014 median of $67,800.

Table 1c shows the net changes by degree:

- **Bachelor:** Among chemical engineers who received a bachelor's degree in 2015, their median starting salary was $66,000, which is a loss in current dollar amount by -1.9% and in constant dollar value of -2.1% from 2014.
- **Master and Doctorate:** Salary figures for new graduates with *Master's degrees* and *Ph.Ds.* are not shown because the sample sizes were too small to be reliable.

Table 1c. Median Full-Time Salaries for **Inexperienced Chemical Engineers** 2014-2015

	Median Salary in Current Dollars		% Change from 2014	
	2014	2015	Current Dollars	Constant Dollars*
All Chem. Engrs.	$67,800	$69,200	+2.1%	+1.9%
Bachelor's	67,300	66,000	-1.9%	-2.1%

* Rate of inflation = 0.2%

MEAN STARTING SALARIES

Mean Starting Salaries for all New Graduates: Among all inexperienced new graduates (both chemistry and chemical engineering), the 2015 mean starting salary of $48,200 represented a +$1,400 increase in current dollars over 2014. With a low 0.2% rate of inflation, the vast majority of the increase in mean salary translated into an increase in real value. Mean starting salary for 2015 increased in value by +$1,300 once factoring for inflation.

Note: Mean salaries tend to be higher than corresponding median salaries, because several graduates including chemical engineers – a smaller group overall -- are able to command significantly higher salaries, which skews the corresponding means higher.

Table 2a. Mean Full-Time Starting Salaries for **Inexperienced** New Graduates
(Chemistry & Chemical Engineering Graduates Combined 2014-2015)

	Mean Salary in Current Dollars		% Change from 2014	
	2014	2015	Current Dollars	Constant Dollars*
All New Graduates	$46,800	$48,200	+3.0%	+2.8%
Bachelor's	43,400	44,200	+1.8%	+1.6%
Master's	50,700	53,100	+4.7%	+4.5%
Doctorate	66,700	75,300	+12.9%	+12.7%

* Rate of inflation = 0.2%

- **Bachelor:** Mean starting salary for new bachelor's graduates increased +$800 from $43,000 in 2014 to $44,200 in 2015.
- **Masters:** New master's graduates earned a mean starting salary of $53,100 this year, a +$2,400 increase over 2014.
- **Doctorate:** Among new PhD graduates, the mean starting salary increased +12.9% from $66,700 in 2014 to $75,300 in 2015. The mean salary in 2015 was more akin to PhD salary in 2013 and prior.

Means for Inexperienced Chemistry Graduates: When looking exclusively at new chemistry graduates, the mean starting salary in 2015 increased by +$400 over the 2014 mean. The gain was a modest +0.7% increase in constant dollar value.

Table 2b. Mean Full-Time Starting Salaries for **Inexperienced Chemistry** Graduates (2014-2015)

	Mean Salary in Current Dollars		% Change from 2014	
	2014	2015	Current Dollars	Constant Dollars*
All Chemists	$42,800	$43,200	+0.9%	+0.7%
Bachelor's	38,200	39,400	+3.1%	+2.9%
Master's	50,700	n.a.	--	--
Doctorate	66,100	70,300	+6.4%	+6.2%

* Rate of inflation = 0.2%
Cells with fewer than 15 cases not available and indicated with "n.a."

Referring to **Table 2b**, the net changes by degree for inexperienced new chemistry graduates were:

- **Bachelor:** Mean starting salary among new chemists with a bachelor's degree increased +$1,200 from 2014 to 2015.
- **Masters:** Salary figures for new graduates with a *master's degree* are not shown because the sample sizes were too small to be reliable.
- **Doctorate:** Mean starting salary among new PhD chemists increased by +6.4% from $66,100 in 2014 to $70,300 in 2015, a difference of +$4,200 in current dollar amounts.

Means for Inexperienced Chemical Engineers: New chemical engineering graduates earned a mean starting salary of $68,100 in 2015, a mean starting salary +$1,200 higher than in 2014.

Table 2c. Mean Full-Time Salaries for **Inexperienced Chemical Engineers** (2014-2015)

	Mean Salary in Current Dollars		% Change from 2014	
	2014	2015	Current Dollars	Constant Dollars*
All Chem. Engrs.	$66,900	$68,100	+1.9%	+1.7%
Bachelor's	66,400	64,400	-3.1%	-3.3%

* Rate of inflation = 0.2%

Table 2c shows the net changes by degree:

- **Bachelor:** Mean starting salary among newly graduated chemical engineering bachelor's declined -3.1% or by $2,000 since last year's survey.
- **Masters and Doctorate:** Sample sizes for *Master's degree* and *PhD* recipients are too small to be reliable and are not shown.

SALARY INCREASES OVER TIME

Table 3 documents the median starting salaries of inexperienced chemists and chemical engineers in current dollars by degree from 1985 to 2015. Over this period, starting salaries for new inexperienced bachelors have nearly doubled for chemists ($19,500 to $36,900) and more than doubled for chemical engineers ($28,000 to $67,300).

Table 3a. Median Starting Salary for **Inexperienced** Graduates by Degree 1985-2009 ($000)

	Chemists			Chemical Engineers		
Year	B.A./B.S.	M.S.	Ph.D.	B.A./B.S.	M.S.	Ph.D.
1985	19.5	27.0	35.9	28.0	31.4	40.0
1986	18.6	26.1	38.0	28.4	31.0	41.5
1987	20.0	28.0	38.4	30.0	32.5	43.0
1988	21.9	27.7	40.5	31.0	33.0	44.4
1989	23.0	30.3	42.0	33.0	36.0	47.0
1990	23.0	30.0	44.0	35.2	37.2	50.0
1991	23.0	32.0	46.0	37.5	40.2	52.0
1992	24.0	31.5	47.5	40.0	41.5	54.0
1993	24.0	34.0	50.4	40.5	42.2	52.7
1994	24.0	30.8	48.0	n.a.	n.a.	n.a.
1995	25.0	36.0	50.0	40.0	44.2	59.2
1996	25.0	34.1	45.0	41.5	45.0	57.0
1997	28.0	37.5	54.0	42.0	47.0	60.0
1998	29.5	38.5	59.3	45.0	49.8	65.0
1999	30.0	42.0	61.0	47.0	52.0	67.7
2000	34.3	44.1	64.5	49.4	55.0	72.0
2001	32.2	43.0	69.5	51.0	60.0	73.5
2002	31.0	45.0	67.0	50.0	59.0	75.0
2003	32.0	44.5	63.3	52.0	55.0	72.0
2004	32.6	43.3	65.0	52.0	59.3	78.6
2005	35.0	45.0	72.0	54.0	62.2	83.0
2006	35.0	47.4	60.0	55.8	58.0	78.0
2007	37.0	48.0	75.0	58.0	65.5	84.5
2008	35.0	49.8	75.0	63.0	60.0	85.0
2009	33.6	48.5	73.1	66.0	60.0	86.8

Table 3b. Median Starting Salary for **Inexperienced** Graduates by Degree 2010-2015 ($000)

	Chemists			Chemical Engineers		
Year	B.A./B.S.	M.S.	Ph.D.	B.A./B.S.	M.S.	Ph.D.
2010	35.0	45.1	72.0	64.0	n.a.	93.5
2011	35.0	46.7	76.0	62.5	n.a.	100.0
2012	36.0	46.5	74.5	66.8	75.2	93.0
2013	35.4	55.0	75.0	66.7	n.a.	n.a.
2014	36.9	52.0	60.0	67.3	n.a.	n.a.
2015	38.0	n.a.	72.0	66.0	n.a.	n.a.

Cells with fewer than 15 cases not available and indicated with "n.a."

The gaps between starting levels for each of the 3 *chemistry* degrees have also changed:

- **1985:** The starting median for an M.S. degree in chemistry in 1985 was $27,000 or 39% more than the bachelor's degree median of $19,500. The starting median for a Ph.D. in chemistry was $35,900 or 33% higher than the M.S. degree.
- **2015:** The difference in median starting salary between a new bachelor at $38,000 and a new PhD at $72,000 is $34,000. A new PhD earned +89% more than a new bachelor in 2015. The salary gap between new a bachelor and new PhD graduate is smaller than in 2005 where a new PhD earned +105% more than a bachelor's graduate.
- **Benchmark Highs:** The highest starting median salary for *chemists* with a bachelor's degree was $38,000 in 2015. Highest salary for chemists with more advanced degrees were $55,000 for a master's degree in 2013, and $76,000 for a Ph.D. in 2011.

Chemical engineers start with higher salaries but the gaps between degrees is not quite so big.

- **1985:** In 1985 the starting median for an M.S. degree in chemical engineering was $31,400, which was just 12% higher than the starting median for bachelors of $28,000. The Ph.D.'s starting median was $40,000 or 27% higher than the M.S. median.
- **2015:** Sample sizes for *Master's degree* and *PhD* recipients are too small to be reliable and are not shown.

Figures 1a & 1b depict the median salary trends for new inexperienced chemists and chemical engineers in 2007 constant dollars (2007 was chosen as a milestone due to it being widely recognized as a significant period of correction of the global economy). Since 2007, the effective median starting salary in 2007 constant dollars among the three degree levels have been converging and trending lower in value.

Figure 1a: Median Starting Salaries 2007 - 2015 for Inexperienced Chemists Working Full-Time in 2007 Dollars

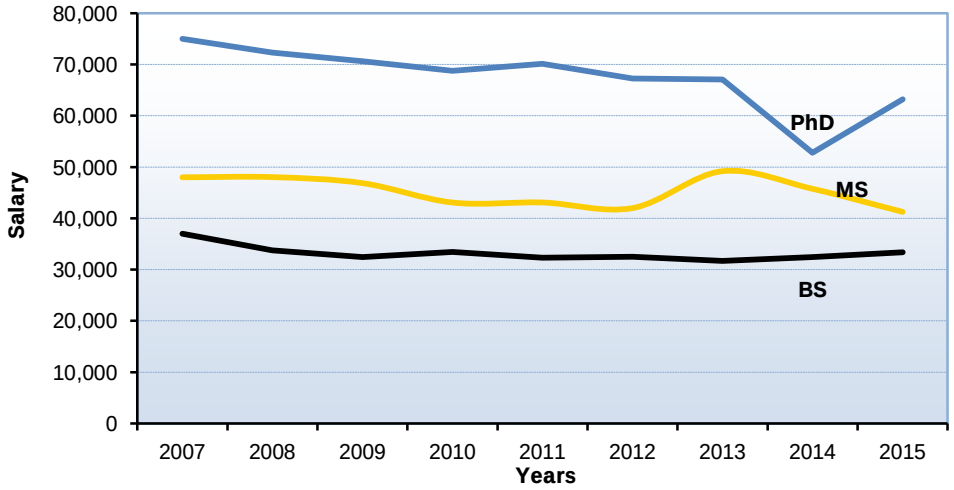
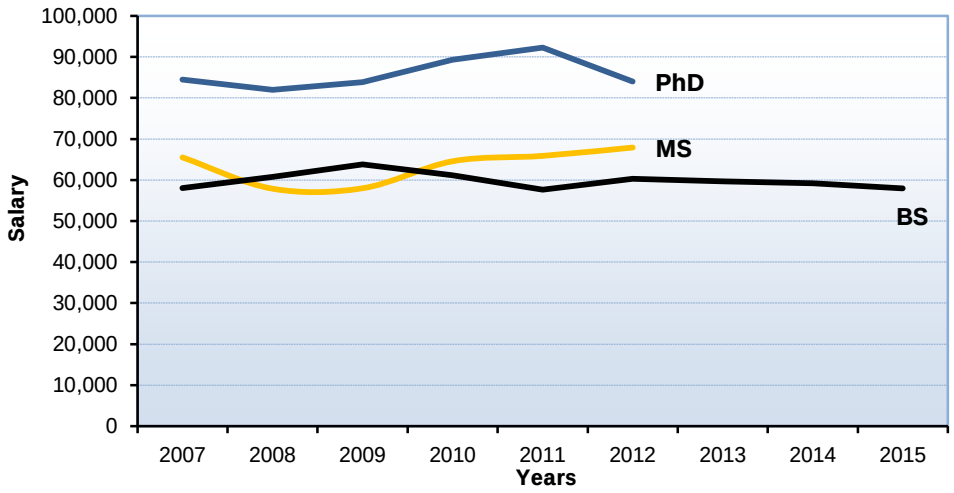


Figure 1b: Median Starting Salaries 2007-2015 for Inexperienced Chemical Engineers Working Full-Time in 2007 Dollars



STARTING SALARIES BY PERCENTILE

Table 4a and 4b break down starting salary in percentile ranges for inexperienced full-time permanently employed chemistry and chemical engineering graduates, respectively.

- **Bachelor:** The starting salary range (10th to 90th percentile) among new bachelor's degree chemists in 2015 ($27,000 to $53,500) closely matched the salary range from 2014 ($26,900 to $53,000). In 2015 the 90th percentile earned +98% more than the 10th percentile, this comparison was +97% in 2014.
- **Master:** The sample size for *master's degree* recipients are too small to be reliable and are not shown.
- **Doctorate:** Among new PhD chemistry graduates, the starting salary range expanded in 2015. The 90th percentile earned a starting salary ($105,000) that was +147% higher than new PhD graduates in the 10th percentile ($42,500). In 2014 the comparative difference was +130%.

Table 4a. Ranges of Starting Salaries of **Inexperienced Full-Time** Employed **Chemistry** Graduates by Degree 2014 & 2015

	Bachelor's		Master's		Doctorates	
	2014	2015	2014	2015	2014	2015
90th Percentile	53,000	53,500	70,000	n.a.	96,500	105,000
75th Percentile	45,000	45,000	57,000	n.a.	86,000	88,500
50th Percentile	36,900	38,000	52,000	n.a.	60,000	72,000
25th Percentile	30,000	32,000	42,500	n.a.	50,000	52,000
10th Percentile	26,900	27,000	32,000	n.a.	42,000	42,500
Mean	38,200	39,400	50,700	n.a.	66,100	70,300
Count	274	262	17	11	49	36
Std. Deviation	10,800	11,896	13,300	n.a.	21,300	21,928
Std. Error of Mean	650	735	3,263	n.a.	3,039	3,655

Cells with fewer than 15 cases not available and indicated with "n.a."

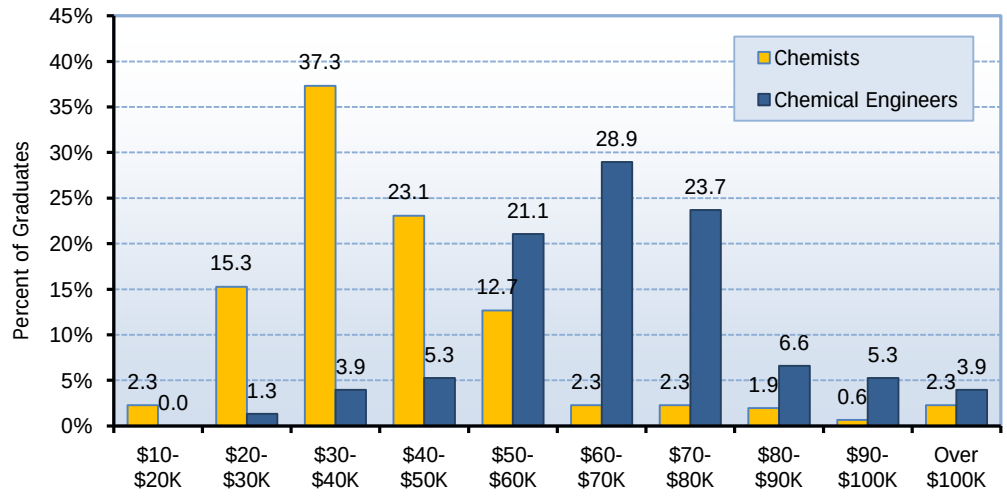
Table 4b: The 90th percentile starting salary for new chemical engineering grads was +$28,000, +56% above the starting salary of the 10th percentile in 2015. In 2014, the 90th percentile earned +94% more than the 10th percentile. Sample size for chemical engineers were smaller than they are for chemists, so results tend toward higher volatility.

Table 4b. Range of Starting Salaries for **Inexperienced Full-Time** Employed **Chemical Engineering** Graduates with Bachelor's Degrees 2014 & 2015

	Bachelor's	
	2014	2015
90th Percentile	87,600	78,000
75th Percentile	74,900	73,000
50th Percentile	67,300	66,000
25th Percentile	60,000	56,000
10th Percentile	45,000	50,000
Mean	66,400	64,400
Count	62	63
Std. Deviation	16,100	13,167
Std. Error of Mean	2,044	1,659

Figure 2 shows the distribution of starting full-time salary. New chemistry graduates are in yellow and new chemical engineering graduates are in blue. Figure 2 shows that the majority of chemistry graduates, 60.4%, earned a starting salary between $30,000 and $50,000. The majority of new chemical engineering graduates earned more -- 73% had a starting salary between $50,000 and $80,000.

Figure 2: Percent of Inexperienced New Graduates in Each Starting Salary Range (2015)



SALARIES BY EMPLOYMENT SECTOR

Median Salaries by Employment Sector: Over the past five years (2011-2015), new graduates have taken jobs in the following proportions:

Table 5a. Placement of Inexperienced New Graduates (2011-2015)

Sector	Chemistry Graduates	Chemical Engineering Graduates
Industry	76%	93%
Academia	17%	4%
Government	7%	3%

The combined 2011-2015 data reveal government jobs have paid the highest median starting salary for new *chemistry* graduates during the past 5 years, on average:

Table 5b. Median Salaries for Inexperienced New Graduates (2011-2015)

Sector	Chemistry Graduates	Chemical Engineering Graduates
Industry	40,000	67,000
Academia	39,000	n.a.
Government	40,900	n.a.

Medians are based on unadjusted current dollar data as collected across the 5 year period. Cells with fewer than 15 cases not available and indicated with "n.a."

Table 6 compares starting full-time median salaries for inexperienced new graduates by employment sector for 2014 and 2015. The strongest growth in starting salary occurs in the government sector, where starting median salary increased by +4.9% over 2014 to $43,000. However, new graduates in the industry sector had the highest median starting salary at $44,000 in 2015.

Table 6. Median Salaries for **All Inexperienced** New Graduates Working **Full-Time Permanent** Jobs by Employment Sector 2014-2015

	Median Salary in Current Dollars		% Change from 2014	
	2014	2015	Current Dollars	Constant Dollars*
All Sectors	$42,000	$43,000	+2.4%	+2.2%
Industry	42,500	44,000	+3.5%	+3.3%
Government	41,000	43,000	+4.9%	+4.7%
Academia	40,000	40,000	+0.0%	-0.2%

* Rate of inflation = 0.2%

EQUALITY OF THE SEXES

New inexperienced female chemistry graduates earned a starting median salary of $39,500, a figure roughly the same as males ($40,000). The $500 difference has new female graduates earning about -1.3% less across all degrees. When looking specifically at newly graduated chemists with a bachelor's degree, female starting salaries were -5.9% below that of males.

However, new inexperienced female chemical engineers working full-time started with a median salary that was +$4,500 (+6.6%) above the starting median salary for all new inexperienced male chemical engineers. Among newly graduated bachelor's degree holders, the salary advantage that female chemical engineers have over their male counterparts was even more pronounced at +12.9% or +$8,000.

The sub-samples for inexperienced chemists with master's degrees and chemical engineers with master's degrees and PhD's are quite small and therefore not shown.

Table 7. Median Starting Salaries for Male and Female **Full-Time Permanent Inexperienced** Chemists and Chemical Engineers by Gender in 2015

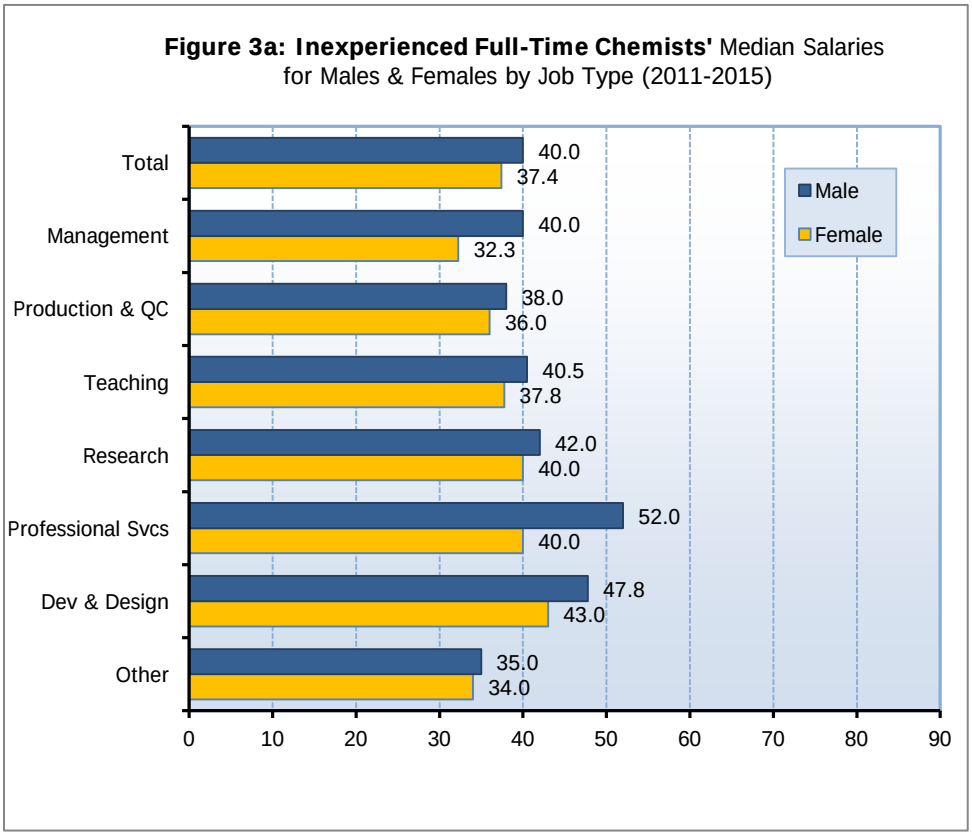
	Chemistry Graduates			Chemical Engineering Graduates		
	Male	Female	Difference	Male	Female	Difference
All Degrees	40,000	39,500	-1.3%	68,000	72,500	+6.6%
Bachelor's	39,300	37,000	-5.9%	62,000	70,000	+12.9%
Master's	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Doctorate	68,500	70,000	+2.2%	n.a.	n.a.	n.a.

Cells with fewer than 15 cases not available and indicated with "n.a."

Chemists: Figure 3a compares male and female median starting salaries for *chemists* with less than 12 months professional or technical work experience by different job types. To obtain a representative sample across a fairly large number of breaks, data over a five-year span (2011-2015) was aggregated to base the results on a robust sample.

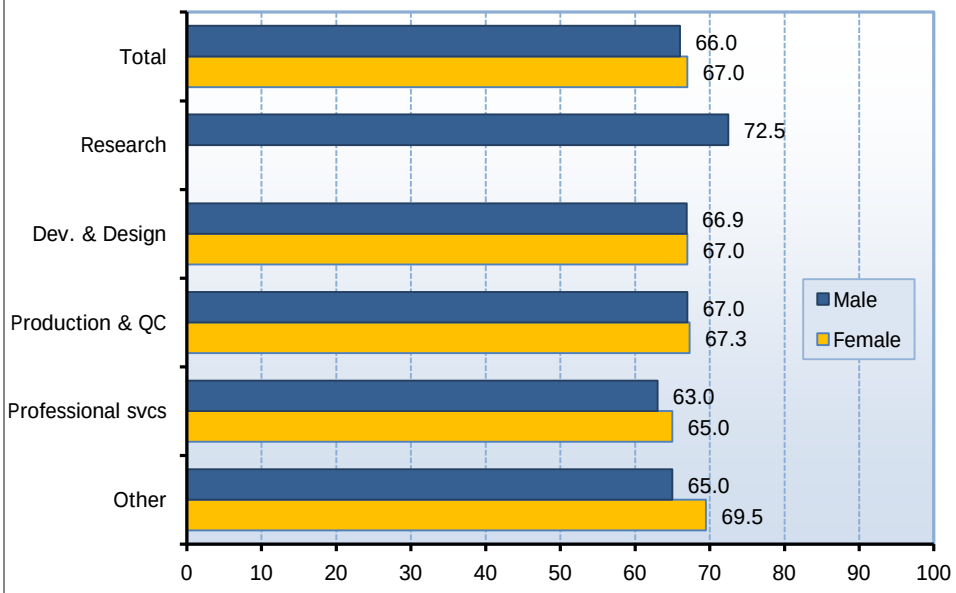
Across all the job categories, among inexperienced chemists over the past 5 years, males receive a median starting salary +$2,600 higher than females. The job categories with the widest gulf in starting salary between males and females are Professional Services (males +$12,000) and Management (males +$7,700). Starting salaries among those in Production / Quality Control and Research have the smallest difference between males and females (males +$2,000).

Figure 3a: Inexperienced Full-Time Chemists' Median Salaries for Males & Females by Job Type (2011-2015)



Chemical Engineers: Among inexperienced chemical engineers, the five-year average (2011 to 2015) of starting median salaries for males (median $66,000) and females (median $67,000) are fairly similar. However, as a reminder, interpret the results with some caution as the samples for chemical engineers tend to be small, even over 5 years of data.

Figure 3b: Inexperienced Full-Time Chemical Engineers'
Median Starting Salaries for Males & Females by Job Type (2011-2015)



Cells with fewer than 15 cases have been omitted from this chart

PLANS FOR ADVANCED STUDY

Table 8: As of fall 2015, 32.3% of all new graduates (chemistry and chemical engineering) said that they are currently enrolled to pursue advanced studies full-time. Another 3.3% said that they are enrolled part-time. Chemistry graduates more than twice as likely as chemical engineering graduates to be enrolled in some form of advanced study. Females (33.9%) are slightly more likely to be enrolled full-time than males (30.6%).

Table 8. Advanced Studies by Degree Field and Gender (2015)

	Degree Field			Gender		
	Chem. (n = 1,673)	Chem. Engr. (n = 175)	Total (n = 1,498)	Female (n = 859)	Male (n = 784)	Total (n = 1,643)
Enrolled Full-Time	34.3%	14.9%	32.3%	33.9%	30.6%	32.3%
Enrolled Part-Time	3.6%	1.1%	3.3%	3.5%	3.2%	3.3%
Not Enrolled	62.1%	84.0%	64.4%	62.6%	66.2%	64.3%

Among new graduates, the proportion of new graduates enrolled in post-graduate education within a year has been in decline. In 1987, 60.0% of new graduates were enrolled in advanced studies. In 2015, the proportion of new graduates enrolled in advanced studies, either full or part-time, within the year has declined to 37.9%.

Table 9 (next page) shows the fields of advanced study that new chemistry and chemical engineering B.S./B.A. and M.S. graduates have enrolled in for fall 2015. The table combines full and part-time students and breaks out the fields of study by chemistry and chemical engineering graduates who are continuing their education. Because the sample sizes are fairly thin for reliably covering the list of advanced degree fields of study, the table shows the combined results over 5 years (2011-2015) for enhanced stability. It is important to note that the 5 year results do not differ much from the 2015 solo results, indicating that the data holds together quite well on a year-over-year basis.

New chemistry graduates in pursuit of advanced degrees were most likely to pursue advanced study in chemistry (35.2%). Outside of further chemistry education, 19.2% chose to study a scientific field (fields 2 through 6 on the list), and 39.2% pursue degrees in the medical profession (medicine, dentistry, pharmacy). The remaining 6.3% study non-scientific professions such as business management, education, law or other endeavors.

Chemical engineers are more strongly focused on advancing their chemical engineering expertise. Based data over the past 5 years, 53.1% pursued advanced study in either chemical or biochemical engineering.

Table 9: Fields of Advanced Study Started in Fall of the Year of Graduation by Chemistry and Chemical Engineering Graduates Across 2011-2015

	Chemistry	Chemical Engineering
	2011-2015 (n = 3,334)	2011-2015 (n = 160)
Chemistry	35.2%	8.8%
Other Physical Science/Math	4.9%	5.0%
Chem/Biochem Engineering	1.6%	53.1%
Other Engineering	1.3%	10.0%
Biochemistry	8.1%	1.9%
Life Science	3.3%	1.3%
Medicine	24.7%	10.0%
Dentistry	3.0%	0.0%
Pharmacy	11.5%	1.9%
Business Management	1.2%	2.5%
Education	3.1%	2.5%
Law	0.9%	2.5%
Other	1.1%	0.6%

EMPLOYMENT STATUS

EMPLOYMENT STATUS

Table 10 below brings all employment variables tracked by the new graduate study together in a single summary table for all 2015 graduates:

Table 10. Summary of Employment Status for All New Graduates 2015

Employment Status	Respondent Counts	Percent
Full-Time Permanent	563	31.5%
Full-Time Temporary	220	12.3%
Part-Time Permanent	34	1.9%
Part-Time Temporary	85	4.8%
Graduate Student/Postdoc	600	33.6%
Not Employed/but Seeking	220	12.3%
Not Employed/not Seeking	66	3.7%
TOTAL	1,788	100.0%

UNEMPLOYMENT

In five-year brackets, from 2000 to 2005, 2005 to 2010, and now from 2010 to 2015, unemployment among new graduates trended upward.

Figure 4: Unemployment Rate Among New Graduates Compared with ACS Members 2000-2015

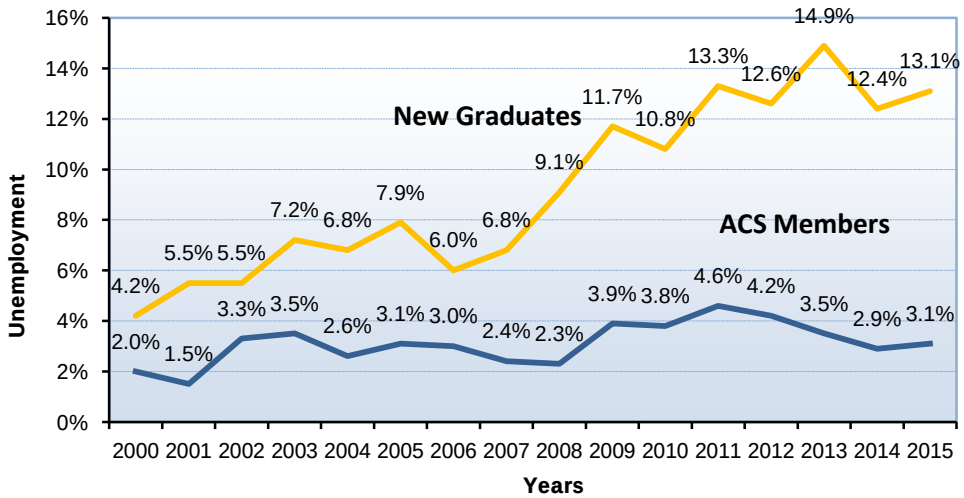
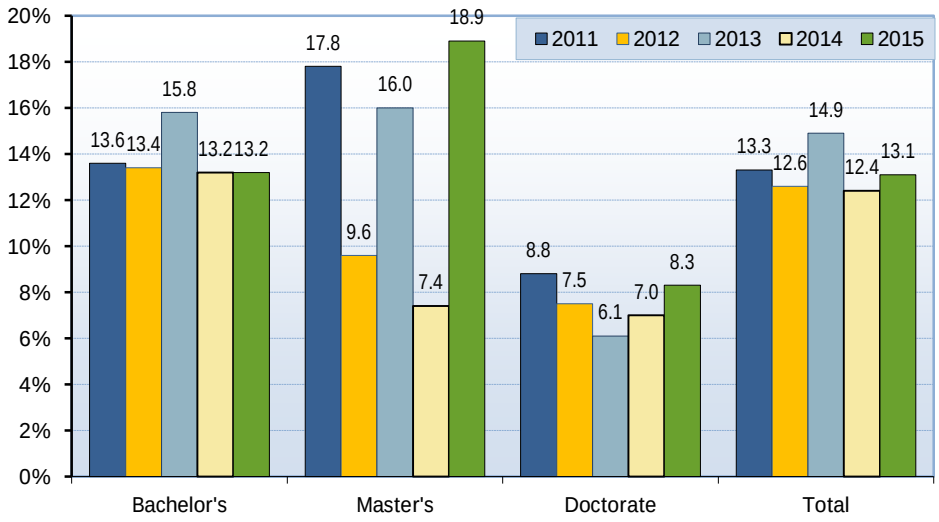


Figure 5 provides comparison of unemployment rates for new graduates by degree from 2011 to 2015. Overall, the employment picture for new chemistry and chemical engineering graduates moves slightly higher to 13.1%. Over the five-year view (2011-2015), the unemployment rate has been fairly flat. With the exception of 2013, unemployment among new graduates hovered around 13%.

Figure 5: Unemployment Rates for All New Graduates by Degree

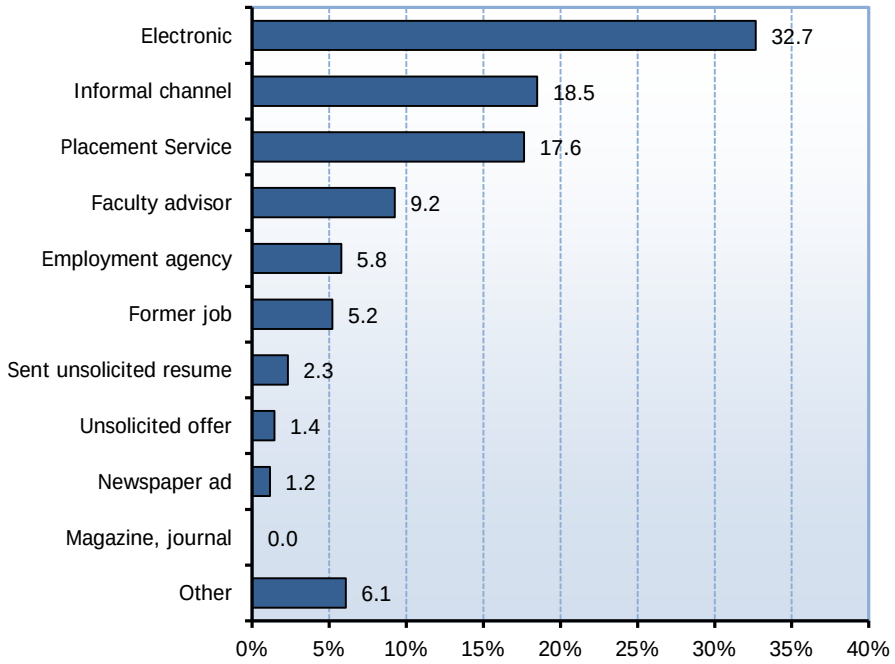


JOB SEARCH

Graduates that found full-time permanent employment by October 1, 2015 were asked to name the "one most effective job search method" they used. The results are shown in **Figure 6.**

In searching for a job, approximately 1 in 3 (32.7%) new graduates indicate that electronic resources were the most effective methods. These resources include Internet search, as well as job posting sites such as Indeed.com and CareerBuilder.com. New graduates also visited specific company websites or networked via sites such as Linked-In. About 1 in 5 (18.5%) found informal channels, such as a colleague or friend, was the most effective method. New graduates rated a placement service as the third most effective (17.6%).

Figure 6: The One Most Effective Job Search Method (2015)



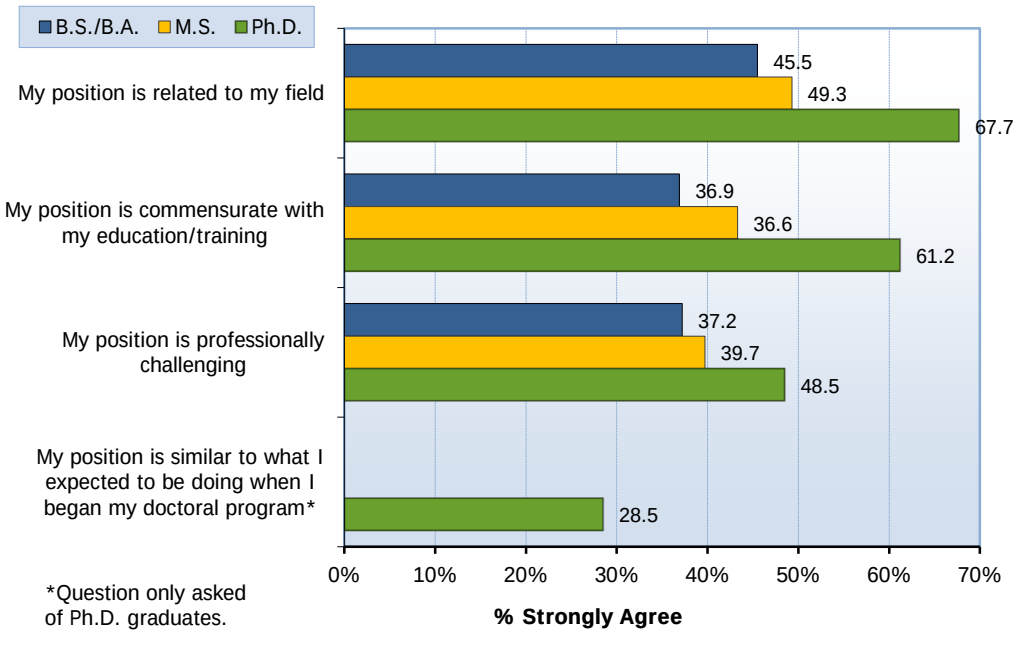
JOB SATISFACTION

Graduates who found full-time permanent employment were asked a series of questions about the efficacy of their educational training when it came to preparing them for their job. Three questions were asked (4 for Ph.Ds.) using a scale of *strongly agree, agree, no opinion, disagree* and *strongly disagree.* "Strongly agree" is the most sensitive response and represents the result that university programs are trying to achieve.

Figure 7 shows the "strongly agree" results for chemistry graduates. As one would expect, PhD's are more likely to "strongly agree" that their position is *related to their field, is commensurate with education* and *position is professionally challenging.* PhD's have more specialized knowledge bases that are sought after and they tend to have greater responsibility than those with a bachelor's degree.

The effect of a master's degree does not appear to have as much influence on satisfaction as a doctorate degree on a new graduate's professional role. New master's degree graduates only feel slightly more likely than bachelor's degree graduates to strongly agree that their *position is commensurate with education* and their *position is professionally challenging.*

Figure 7: Agreement or Disagreement with Statements Regarding Their Primary Employment (2015)
(% Strongly Agree on a 5-Point Scale)



DEMOGRAPHICS

Table 11. 2015 New Graduate Demographics (n = 1,864)

	Count	Percent
Highest Degree		
Bachelor's	1,606	86.8%
Master's	96	5.2%
Doctorate	149	8.0%
Field of Study		
Chemistry	1,635	89.1%
Chemical Engineering	197	10.7%
Non-Chemistry	4	0.2%
Gender		
Female	923	51.5%
Male	870	48.5%
Ethnicity		
American Indian	15	0.9%
Asian	215	12.5%
Black	96	5.6%
White	1,252	72.7%
Multiracial	80	4.6%
Other	64	3.7%
Age		
21 or Under	136	7.4%
22	700	38.2%
23-24	495	27.0%
25-29	316	17.2%
30-34	120	6.5%
35-39	37	2.0%
40-49	22	1.2%
50-64	7	0.4%
65 and Over	0	0.0%

Counts may not total 1,864 because not all respondents answered

Table 11 holds demographics for all new graduates participating in the ACS survey. It provides a breakout of highest degree earned, field of study, gender, ethnicity and age of all respondents. The majority received a bachelor's degree (86.8%), studied chemistry (89.1%), are White (72.7%) and between the ages of 22 and 29 (82.4%). Gender representation skews slightly female (51.5%).

Table 12 divides the respondents by the degree they received. New PhD graduates skewed male in 2015. They were 48.5% of new graduates responding to the survey, but accounted for 59.3% of respondents with a new doctorate degree.

New PhD graduates in 2015 also skewed white. 72.7% of eligible survey respondents were white, but white respondents accounted for 80.0% of those who earned a doctorate degree.

Among new graduated bachelor's degree holders, 74.2% were between the ages of 22 to 24 years old. Age trended upward for more advanced degrees.

Table 12. 2015 Demographics by Degree (n = 1,864)

	Bachelor's	Master's	Doctorate
Field of Study			
Chemistry	89.5%	86.5%	86.3%
Chemical Engineering	10.3%	13.5%	13.7%
Non-Chemistry	0.3%	0.0%	0.0%
Gender			
Female	52.5%	51.1%	40.7%
Male	47.5%	48.9%	59.3%
Ethnicity			
American Indian	0.9%	0.0%	1.7%
Asian	13.0%	11.8%	6.1%
Black	5.5%	6.5%	5.2%
White	72.4%	68.8%	80.0%
Multiracial	4.6%	7.5%	3.5%
Other	3.6%	5.4%	3.5%
Age			
21 or Under	8.0%	4.2%	0.0%
22	44.2%	1.0%	0.0%
23-24	30.0%	17.7%	0.0%
25-29	12.1%	47.9%	53.1%
30-34	3.2%	15.6%	37.9%
35-39	1.4%	4.2%	7.6%
40-49	0.9%	6.3%	0.7%
50-64	0.2%	3.1%	0.7%
65 and Over	0.0%	0.0%	0.0%

SCOPE AND METHOD

PURPOSE

The ACS Survey of New Graduates 2015 is part of an ongoing series of annual surveys conducted by the ACS on the employment and future plans of new chemistry and chemical engineering graduates. The primary purpose of the survey is to gather data on the starting salaries and occupational status of new chemists and chemical engineers who graduated during the 2014-2015 academic year. The survey covers bachelors, masters, and doctoral degree recipients.

SAMPLING AND DATA COLLECTION

The ACS Survey of New Graduates 2015 reflects responses from chemistry and chemical engineering college students graduating during the 2014 and 2015 academic year. Chemistry graduates were solicited from universities containing ACS approved chemistry programs, while chemical engineering graduates were solicited from universities with ABET accredited chemical engineering programs.

Responses were solicited from n graduates having full U.S. mailing addresses, to complete either the paper or online version of the New Graduate Survey in 2015. Of those graduates that had valid addresses, and 1,974 usable responses were received. The ACS Department of Research and Product Development identified potential participants for this study by requesting the names and addresses of recent graduates from the Office on Professional Training (OPT), an internal department of ACS.

Survey questionnaires were mailed by first class mail in October and November 2015. Two reminder postcards were also mailed. Data collection concluded early January 2016. Of the 12,351 successfully contacted, a total of 1,974 usable responses were received, resulting in a 15.9% response rate. Respondents could complete the survey by mail (n=400) or online (n=1,574). The margin of error at 95% confidence is +/-2.0%.

TECHNICAL NOTES

DISCREPANCIES AMONG TABLES

Because not all individuals responded to all of the survey items, some pairs of tables contain totals that should be identical but are not. For example, one table may group Ph.Ds. by gender and another by employer. The totals will differ unless the number who did not indicate their gender is the same as the number who did not indicate their employer.

ESTIMATES OF MEDIAN SALARIES

Some median salary data presented in salary tables are based on small samples and subject to sampling error. As a precaution, median salary results in all table cells with fewer than 15 respondents are suspect to being unreliable and are not shown in this report. Instead "n.a." has been posted to these data cells and other tabled cells with fewer than 15 respondents.

In some instances, this report uses multi-year samples to improve the validity and reliability of the sample data being reported. Nevertheless, caution should be used in interpreting results of any findings based on small samples.