

SALARY & EMPLOYMENT SURVEY

Survey of **ACS MEMBERS** shows mixed conditions for chemists in 2012

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CHEMISTS CONTINUE to struggle with the lingering effects of the poor economy, despite the fact that the Great Recession officially ended more than three years ago in the U.S. Salaries for chemists have fallen slightly in 2012 compared with 2011, according to the latest figures compiled by the American Chemical Society. There is some good news to report, however: Unemployment is down, if only a bit. These results come from the 2012 Comprehensive Salary & Employment Survey of ACS members in the workforce, which the society conducted from March through early May this year. The data show that the median salary for chemists slipped more than 1% between 2011 and 2012.

Over that same time frame, full-time employment changed from a rate of 89.7% to 90.0%. That means that the fraction of chemists without full-time employment dropped from 10.3% to 10.0%. Within that group, the share of chemists who were unemployed but looking for jobs fell from a peak of 4.6% in 2011 to 4.2% in 2012. The proportion of chemists with part-time jobs shrank from 3.7% to 3.1%. And 2.6% of respondents were holding a job as a postdoc in 2012, up from 1.9% the year before.

In a project headed by Gareth S. Edwards, the ACS Department of Research & Member Insights conducted

and analyzed the survey under the guidance of the ACS Committee on Economic & Professional Affairs.

The survey was sent to a random sample of 20,128 ACS members under the age of 70;

the sample excluded student, emeritus, and retired members, as well as members living outside the U.S. The survey recipients returned 7,064 complete responses, for a response rate of 35.1%.

IN THE SURVEY, members were queried about their status as of March 1, 2012. Some of the questions in the survey were directed at all respondents; the answers to those questions shed light on the demographics of the ACS membership. Other questions focused on those ACS members who are in the chemical workforce and excluded members who work in other fields, such as chemical engineering, business administration, computer science, or law. In each table

in this article, the headline and footnote indicate the group whose data are presented.

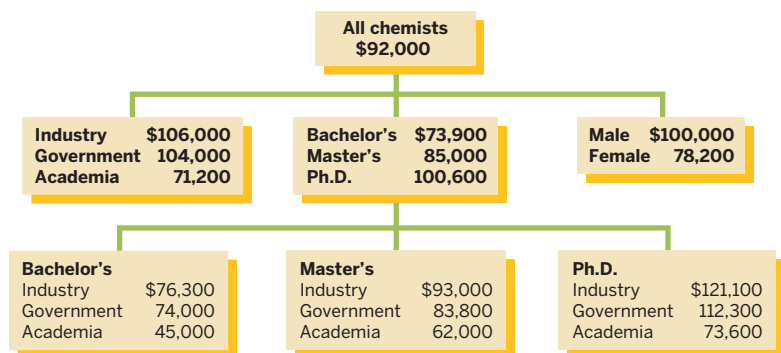
The survey revealed that the median salary for chemists who were employed full-time—and who had not changed jobs over the prior year—fell 2.1% in 2012 to \$92,000. That decline hit those with a Ph.D. hardest. This group saw a 2.0% drop in median salary to \$100,000. Chemists with a master's degree saw no change in salary from March 2011 to March

2012, while those with a bachelor's degree experienced an increase of 1.9% to \$74,200.

Greater disparities can be found when respondents are broken down into subgroups by citizenship. Chemists born in the U.S. saw a 2.2% decline in median salary to \$91,000 from 2011 to 2012. The median salary rose 0.7% to \$108,200 for naturalized citizens and held steady at \$90,000 for permanent residents. But other visa holders suffered an 11.7% drop to \$47,000.

From 2011 to 2012, the median salary fell 1.0% to \$100,000 for chemists with government jobs who hadn't changed their positions in the previous year. The median salary for those employed in aca-

MEDIAN BASE SALARIES Industry and government jobs paid much better than those in academia.



NOTE: Median annual base salaries for chemists employed full-time as of March 1, 2012.
SOURCE: ACS salary and employment survey 2012

EMPLOYMENT STATUS OF CHEMISTS

Full-time employment edged up despite rise in postdoc appointments

	FULL-TIME	OTHER THAN FULL-TIME EMPLOYMENT			SUBTOTAL
		PART-TIME	POSTDOC	UNEMPLOYED/SEEKING EMPLOYMENT	
2002	92.2%	3.0%	1.5%	3.3%	7.8%
2003	92.1	3.0	1.4	3.5	7.9
2004	90.9	3.6	1.9	3.6	9.1
2005	90.8	4.1	2.0	3.1	9.2
2006	91.3	3.4	2.3	3.0	8.7
2007	92.3	3.6	1.7	2.4	7.7
2008	92.5	3.9	1.3	2.3	7.5
2009	90.3	3.2	2.5	3.9	9.6
2010	88.1	3.9	4.2	3.8	11.9
2011	89.7	3.7	1.9	4.6	10.3
2012	90.0	3.1	2.6	4.2	10.0

NOTE: Employment of chemists as of March 1 each year. Excludes those fully retired or otherwise not seeking employment.
SOURCE: ACS annual salary and employment surveys

demia stayed even at \$70,000, and it rose 0.6% to \$106,600 for chemists in industry.

For all chemists who were employed full-time—whether they had changed jobs in the prior year or not—the survey showed that the median salary slipped 1.1% from 2011 to \$92,000 in 2012. Chemists with a bachelor's degree saw their median salary rise 2.6% to \$73,900. Those with a master's degree held steady at \$85,000, and those with a Ph.D. saw a decline of 1.4% to \$100,600.

COMPARED WITH a decade ago, the median salary for bachelor's chemists has risen an average of 2.5% per year. The median salary for chemists with a master's degree has grown an average 2.2% per year and that for chemists with a Ph.D. has increased an average of 1.7% annually. These findings are in current dollars, and therefore don't account for inflation. The sobering truth is that the average annual change in median salaries over the past 10 years in constant dollars—a calculation that eliminates the effect of inflation—is 0.2% for chemists with a bachelor's degree, -0.1% for a master's, and -0.6% for a doctorate. Overall, the median salary for all chemists has risen an average of 1.9% per year in current dollars, but shrunk 0.4% per year in constant dollars.

Between 2011 and 2012, industry, government, and academic chemists eked out a gain of about 1% in current dollars, bringing their median salaries to \$106,000, \$104,000, and \$71,200, respectively. Chemists who were self-employed did a bit better, reporting that their median salary rose about 2% to \$100,000.

These comparisons

support the widely held presumption that academe is a considerably less lucrative environment for chemists than other employment options. The survey shows that the

median salary as of March 2012 for chemists with a bachelor's degree was \$45,000 in academe versus \$74,000 and \$76,300 in government and industry, respectively.

For chemists with a master's degree, those median salaries were \$62,000, \$83,800, and \$93,000, respectively. Chemists with a Ph.D. had a median salary of \$73,600 in academe, \$112,300 in government, and \$121,100 in industry.

Despite the lower median salary in academe, universities and colleges are attracting an increasing percentage of the ACS membership. In 1995, only one-quarter of ACS members were employed in academe. But more than one-third of members now work there. Government's share of the membership has been much steadier; the sector has attracted between 7 and 8% of members over time. Industry, which hosted nearly two-thirds of ACS members in 1995, supports just 56% of the membership in 2012. Self-employment typically accounts for about 2% of members.

The demographics of ACS members in the workforce are changing in other ways.

ACS MEMBERS BY HIGHEST DEGREE

Diversity varied with degree level

	BACHELOR'S	MASTER'S	PH.D.	TOTAL
BY GENDER				
Men	66.3%	61.9%	74.0%	70.7%
Women	33.7	38.1	26.0	29.3
BY EMPLOYER				
Industry	83.5	66.8	46.9	56.2
Government	6.8	8.4	7.2	7.4
Academia	8.5	23.3	44.2	34.9
Self-employed	1.2	1.6	1.6	1.6
BY CITIZENSHIP				
Native born	93.4	86.6	72.2	78.2
Naturalized	4.9	9.7	13.5	11.4
Permanent resident	1.4	2.9	9.7	7.2
Other visa	0.3	0.8	4.5	3.2
BY RACE				
American Indian	0.9	0.3	0.2	0.3
Asian	3.1	7.1	13.8	10.9
Black	3.4	2.5	2.1	2.4
White	89.2	87.2	81.0	83.4
Other	3.4	2.9	2.9	2.9
BY ETHNICITY				
Hispanic	3.6	3.3	3.3	3.4

NOTE: Data for ACS members employed full-time as of March 1, 2012.
SOURCE: ACS salary and employment survey 2012

SALARY TRENDS FOR CHEMISTS

Removing the effects of inflation shows that salaries for many chemists are lower now than they were in 2002

\$ THOUSANDS	BACHELOR'S		MASTER'S		PH.D.		ALL CHEMISTS	
	CURRENT \$	CONSTANT \$ ^a	CURRENT \$	CONSTANT \$ ^a	CURRENT \$	CONSTANT \$ ^a	CURRENT \$	CONSTANT \$ ^a
2002	\$58.0	\$58.0	\$68.5	\$68.5	\$85.2	\$85.2	\$76.5	\$76.5
2003	59.7	58.5	71.3	69.9	90.0	88.2	80.0	78.4
2004	62.0	59.3	72.3	69.1	91.6	87.6	82.0	78.4
2005	63.0	58.3	74.0	68.5	93.0	86.1	83.0	76.8
2006	65.2	58.4	77.5	69.4	95.0	85.0	85.0	76.1
2007	69.7	60.6	80.0	69.6	96.7	84.1	88.0	76.5
2008	73.0	62.0	82.0	69.7	101.0	85.8	93.0	79.0
2009	66.7	55.9	81.0	67.9	100.0	83.8	90.0	75.4
2010	69.8	57.9	80.0	66.4	98.0	81.3	89.0	73.9
2011	72.0	58.6	85.0	69.2	102.0	83.0	93.0	75.7
2012	73.9	59.1	85.0	67.9	100.6	80.4	92.0	73.5
AVERAGE ANNUAL SALARY CHANGE								
2011-12	2.6%	0.8%	0.0%	-1.8%	-1.4%	-3.2%	-1.1%	-2.9%
2002-12	2.5	0.2	2.2	-0.1	1.7	-0.6	1.9	-0.4

NOTE: Median annual base salaries for chemists employed full-time as of March 1 each year. Average annual increase in Consumer Price Index was 1.8% for 2011-12 and 2.3% for 2002-12. CPI for 2012 is an estimate. ^a Constant dollars are calculated using 2002 as the base year.

SOURCES: ACS annual salary and employment surveys, Bureau of Labor Statistics (CPI data)

For instance, the representation of women continues its gradual expansion. Just 22% of members were female in 1995; that figure currently stands at 29%.

On the other hand, the cultural makeup of the society hasn't changed much since 1995. Some 78% of this year's members were born in the U.S. compared with 82% in 1995. And 83% of members are white, only a slight change from 86% in 1995. The median age of members, at 48 years, is down a bit from the past two years, but tops the median age of 43 in 1995.

MUCH OF THE information collected via the survey can be found in the tables in this article, but other interesting findings abound. For example, unemployment as of March 2012 was lowest for members in the central region of the U.S. and highest in the Pacific region and New England.

Unemployment was worst for members with a bachelor's degree. In March 2012, 5.9% of this group was seeking employment. By comparison, 5.4% of those with master's degrees and just 3.4% of those with doctorates were looking for jobs.

Gender made very little difference in unemployment; the rate for men was 4.2% and for women, 4.1%.

But large differences between men and women show up in other categories in 2012. One example is the salary for chemists working in any field, when broken down by the number of years since earning a bachelor's degree. The median annual salary for men who earned an undergraduate degree two to four years ago was \$46,400; for women, that figure was \$42,000, or 91% of the men's median salary. Five to nine years after a bachelor's degree, the median salary was \$61,100 for men, while women earned 88% of that figure. The greatest disparity arose among chemists who

& DATA ONLINE

Additional results from the ACS salary and employment survey can be found at <http://cenm.ag/survey2012>.

earned a bachelor's degree 25 to 34 years ago. In that category, women earned just 81% of their male counterparts' median salary.

In fact, the median salary for male chemists was higher than that for women in all age groups in 2012. That isn't the case when salaries are parsed more finely, though the resulting small sample sizes mean the data may not fully represent conditions in the working world. Among industrial chemists with a bachelor's degree, for example, the median salary for women was higher than

that for men for those who earned their degree 15 to 19 years ago or 25 to 29 years ago. The same was true for women who earned a master's degree five to nine years ago or 20 to 24 years ago. And women who earned a Ph.D. five to nine years ago or anywhere from 15 to 29 years ago either equaled or beat the median salary for men in those groups.

Similarly, in academe, men and women each topped some salary categories. Among ACS members who were full professors, the median salary for women was less than that for men at most types of schools. But the median salary for women was higher than that for men at schools at which a bachelor's was the highest degree offered.

SIGNIFICANT differences also crop up in other results from the survey. Chemists continue to make considerably less than chemical engineers. As of this March, the median salary for chemical engineers who were members of ACS was \$114,000, 23.9% more than the median salary for chemists.

For members with a bachelor's degree or a Ph.D., the median salaries were higher for chemical engineers than for chemists by 25.8% or 19.3%, respectively. The disparity was even more striking for those with a master's degree: The median salary for chemical engineers was 41.2% higher than that for chemists.

As is the situation for chemists, industry and government pay chemical engineers more than academe. The median salary for a chemical engineer employed in industry was \$120,000 as of March 2012. A job in government netted a median salary of \$114,500 for chemical

ACS MEMBERS IN THE WORKFORCE
Over time, Ph.D.s and those working in academe continued to increase their share of membership

	1995	2000	2005	2010	2011	2012
BY DEGREE						
Bachelor's	24.3%	22.1%	19.9%	17.7%	17.3%	17.1%
Master's	16.9	17.4	17.0	17.9	17.3	16.6
Ph.D.	58.8	60.5	63.1	64.4	65.4	66.3
BY GENDER						
Men	78.5	75.8	74.9	71.5	72.5	70.7
Women	21.5	24.2	25.1	28.5	27.5	29.3
BY EMPLOYER						
Industry	65.5	64.7	62.0	52.7	59.1	56.2
Government	7.9	6.9	7.4	7.3	7.7	7.4
Academia	25.1	26.4	28.8	32.1	31.2	34.9
Self-employed	1.4	2.0	1.8	7.9	1.9	1.6
BY CITIZENSHIP						
Native born	82.3	79.5	79.8	76.0	79.9	78.2
Naturalized	8.5	10.2	10.2	13.1	11.0	11.4
Permanent resident	7.1	6.9	6.5	8.0	6.6	7.2
Other visa	2.1	3.4	3.5	3.0	2.4	3.2
BY RACE						
American Indian	0.2	0.2	0.2	0.2	0.2	0.3
Asian	10.3	11.1	10.9	12.8	9.9	10.9
Black	1.4	1.9	1.9	2.2	2.3	2.4
White	85.8	85.5	85.8	81.0	84.6	83.4
Other	2.3	1.3	1.2	3.8	3.0	2.9
BY ETHNICITY						
Hispanic	2.3	2.5	2.6	3.3	3.3	3.4
MEDIAN AGE (YEARS)	43.3	44.7	47.0	49.0	49.0	48.0

NOTE: Data for ACS members employed full-time as of March 1 each year.
SOURCES: ACS censuses, ACS annual salary and employment surveys

Despite the lower median salary in academe, universities and colleges are attracting an increasing percentage of the ACS membership.

engineers, and one in academe brought in \$91,000.

The size of the employer has a considerable impact on salaries, with the largest companies paying chemists as much as one-third more than the smallest firms. That's the situation for chemists with a bachelor's degree. The effect is much more modest for those with a master's degree, while those with a doctorate fall somewhere in between, earning one-quarter more at the biggest firms compared with the smallest.

CHEMISTS WORKING in R&D management, general management, marketing and sales, and health and safety earned the highest salaries as of March 2012. Jobs with the lowest median salaries included production and quality control, and analytical services.

This is unfortunate, given the large number of ACS members who work in the field of analytical chemistry. This field accounts for 14.8% of members employed either full- or part-time, the largest single sector of the membership. The next largest group—accounting for 10.1% of members—works in organic chemistry. Medicinal and pharmaceutical chemistry follows, with 8.7% of members, while chemical education employs some 7.4% of members.

Organic, physical, and analytical chemistry are the top fields in which chemists earned their

highest degree. These subjects accounted for 23.0%, 10.5%, and 10.4% of employed members' terminal degrees.

The survey turned up some other results that are both intriguing and disturbing.

For instance, the percent of ACS member chemists who were unemployed at some point in 2011 was 8.2%, down slightly from 8.4% in 2010. This number has historically been about twice the March 1 unemployment number, ACS's Edwards notes.

This year's survey also includes for the first time questions related to issues of underemployment and staffing. A little more than 12% of ACS member chemists reported that they had accepted a position or compensation package over the prior three years that was less than their previous position in order to maintain employment.

Unemployment rates remained significantly higher for ACS chemists previously employed in industry (5.4%) than for those from academia (2.2%), according to Edwards.

Nearly two-thirds of ACS chemists reported that their department or business unit was either significantly or somewhat understaffed. Just over 30% of respondents expected their department or company to increase staff over the next year, and 59% believed staffing levels would remain the same; the other 11% expected staffing reductions.

If their predictions prove correct, next year's survey should offer a somewhat brighter picture of the state of the chemical profession. ■

SALARIES OF CHEMISTS

Visa holders and young workers experienced dramatic salary changes, but chemists in most other categories saw little change

\$ THOUSANDS	2011	2012	2011-12	
			\$ CHANGE	% CHANGE
ALL	\$94.0	\$92.0	-\$2.0	-2.1%
BY DEGREE				
Bachelor's	72.8	74.2	1.4	1.9
Master's	86.0	86.0	0.0	0.0
Ph.D.	102.0	100.0	-2.0	-2.0
BY GENDER				
Men	100.0	99.9	-0.1	-0.1
Women	77.7	77.8	0.1	0.1
BY EMPLOYER				
Industry	106.0	106.6	0.6	0.6
Government	101.0	100.0	-1.0	-1.0
Academia	70.0	70.0	0.0	0.0
BY CITIZENSHIP				
Native born	93.0	91.0	-2.0	-2.2
Naturalized	107.4	108.2	0.8	0.7
Permanent resident	90.0	90.0	0.0	0.0
Other visa	53.2	47.0	-6.2	-11.7
BY ETHNICITY				
Hispanic	83.2	85.0	1.8	2.2
BY AGE				
20-29	50.5	47.0	-3.5	-6.9
30-39	75.0	75.0	0.0	0.0
40-49	96.1	93.8	-2.3	-2.4
50-59	109.2	108.0	-1.2	-1.1
60-69	106.0	110.0	4.0	3.8

NOTE: Median annual base salaries for chemists who were employed full-time as of March 1 each year and who had not changed jobs over the prior year.

SOURCE: ACS annual salary and employment surveys

INDUSTRIAL CHEMISTS' SALARIES BY EXPERIENCE AND GENDER

For chemists with a master's or Ph.D., women's salaries approach parity with men's

YEARS SINCE BACHELOR'S DEGREE	BACHELOR'S			MASTER'S			PH.D.		
	(IN THOUSANDS) MEN	(IN THOUSANDS) WOMEN	WOMEN AS % OF MEN	(IN THOUSANDS) MEN	(IN THOUSANDS) WOMEN	WOMEN AS % OF MEN	(IN THOUSANDS) MEN	(IN THOUSANDS) WOMEN	WOMEN AS % OF MEN
2-4	\$47.0	\$45.0	96%	id	id	na	na	na	na
5-9	58.0	54.0	93	\$65.5	\$68.0	104%	\$87.5	\$90.0	103%
10-14	70.0	65.5	94	85.9	74.8	87	100.0	93.4	93
15-19	75.0	77.3	103	95.0	90.9	96	111.2	115.5	104
20-24	83.5	81.5	98	93.5	95.0	102	120.0	120.0	100
25-29	79.0	90.0	114	106.9	96.5	90	132.8	142.3	107
30-34	100.5	95.0	95	109.5	88.5	81	134.9	128.0	95
35-39	99.7	id	na	109.0	99.0	91	144.0	134.0	93
40 or more	101.8	id	na	109.3	id	na	133.5	id	na

NOTE: Median annual base salaries for industrial chemists employed full-time as of March 1, 2012. **id** = insufficient data. **na** = not applicable.

SOURCE: ACS salary and employment survey 2012

ACS MEMBERS BY DISCIPLINE AND GENDER

Gender balance came closest in education jobs

DISCIPLINE	BY HIGHEST DEGREE		BY WORK SPECIALTY	
	TOTAL	% WOMEN	TOTAL	% WOMEN
Agricultural/food chemistry	1.1%	32.9%	1.9%	34.4%
Analytical chemistry	10.4	34.4	14.8	34.7
Biochemistry	8.2	34.2	5.6	34.4
Biotechnology	0.6	21.4	3.9	26.2
Chemical education	1.8	53.2	7.4	50.6
Clinical chemistry	0.1	40.0	0.5	36.1
Environmental chemistry	2.2	30.3	5.1	30.8
General chemistry	9.8	35.8	3.1	42.0
Inorganic chemistry	8.9	29.1	3.4	24.2
Materials science	1.6	26.6	6.1	23.1
Nanochemistry	0.2	35.6	0.9	22.7
Medicinal/pharmaceutical chemistry	2.2	25.3	8.7	23.4
Organic chemistry	23.0	21.8	10.1	20.2
Physical chemistry	10.5	26.4	5.3	23.1
Polymer chemistry	2.9	27.8	6.2	18.5
Other chemical sciences	1.9	38.8	2.5	33.7
Chemical engineering	5.9	20.3	4.2	16.9
Business administration	1.5	21.4	1.4	16.1
Computer science	0.1	14.3	1.1	20.5
Law	0.6	33.3	1.2	24.1
Other nonchemistry	6.6	41.0	6.7	39.3

HOW TO READ THIS TABLE: Of ACS members employed full- or part-time, 1.1% had their highest degree in agricultural/food chemistry, and 32.9% of those were women; 1.9% worked in agricultural/food chemistry, and 34.4% of those were women.

SOURCE: ACS salary and employment survey 2012

INDUSTRIAL SALARIES

Chemists working in management and patents earned some of the highest salaries

\$ THOUSANDS	BACHELOR'S	MASTER'S	PH.D.
BY WORK FUNCTION			
Analytical services	\$70.0	\$85.5	\$110.6
Chemical information	83.1	100.2	135.6
Computers	121.6	92.5	125.3
Health/safety	94.5	106.5	145.0
Management: general	98.5	125.0	135.0
Management: R&D	114.8	116.0	157.0
Marketing/sales	99.9	119.0	119.5
Patents	142.7	112.5	137.8
Production/quality control	68.4	92.0	115.0
Research: applied	78.3	97.0	117.6
Research: basic	73.7	87.4	123.7
BY SIZE OF EMPLOYER			
Fewer than 50	69.5	96.0	105.0
50 to 99	68.3	77.3	115.0
100 to 499	68.5	87.9	115.9
500 to 2,499	74.9	90.0	116.0
2,500 to 9,999	81.5	98.0	123.0
10,000 to 24,999	78.0	103.0	124.8
25,000 or more	95.0	104.4	131.0
ALL	\$80.6	\$99.0	\$125.0

NOTE: Median annual base salaries for industrial chemists employed full-time as of March 1, 2012. **SOURCE:** ACS salary and employment survey 2012

ENGINEERS AND CHEMISTS

Salaries show major disparity between disciplines

\$ THOUSANDS	CHEMICAL ENGINEERS	CHEMISTS
ALL	\$114.0	\$92.0
BY DEGREE		
Bachelor's	93.0	73.9
Master's	120.0	85.0
Ph.D.	120.0	100.6
BY EMPLOYER		
Industry	120.0	106.0
Government	114.5	104.0
Academia	91.0	71.2
BY AGE		
20-29	65.0	47.0
30-39	88.1	76.2
40-49	122.0	92.2
50-59	132.4	108.0
60-69	138.5	108.5

NOTE: Median annual base salaries as of March 1, 2012. **SOURCE:** ACS salary and employment survey 2012

ACADEMIC SALARIES BY GENDER

Salaries of women compared favorably with those of men in several categories

\$ THOUSANDS	NINE- TO 10-MONTH CONTRACTS		
	MEN	WOMEN	WOMEN AS % OF MEN
ASSOCIATE DEGREE-GRANTING SCHOOLS			
Full professor	\$84.0	\$82.0	98%
Associate professor	id	id	na
Assistant professor	id	id	na
BACHELOR'S DEGREE-GRANTING SCHOOLS			
Full professor	80.4	81.9	102
Associate professor	64.0	65.0	102
Assistant professor	55.0	52.0	95
MASTER'S DEGREE-GRANTING SCHOOLS			
Full professor	91.1	85.0	93
Associate professor	68.0	69.0	101
Assistant professor	58.5	id	na
PH.D.-GRANTING SCHOOLS			
Full professor	131.9	120.6	91
Associate professor	85.8	85.0	99
Assistant professor	74.2	74.0	100

NOTE: Median salaries for ACS members in academe as of March 1, 2012. **id** = insufficient data. **na** = not applicable. **SOURCE:** ACS salary and employment survey 2012