



So You Want to Teach College Chemistry?

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Larry Potts



What Are Your Professional Aspirations?

- 1) As a trial occupation or as a career? (it's hard to start after being in industry)
- 2) What subject matter? Reach beyond your science?
- 3) What level? (there are at least 6 different types of school from CCs to university graduate programs)
- 4) How important is research to you? (influences answer to 3)
- 5) What kind of lifestyle do you aspire to? (this will depend on your choice in 3).

2) What subject matter? Reach beyond *your* science?

First course assignment may not be in your specialty area.

Intro / Gen level vs. advanced level.

You may not be well prepared to teach undergrads in an advanced course, which must have a survey component.

At PUIs you probably will not have instruments you know, and you may have to fix what's there.



You will learn a lot in the first few years!

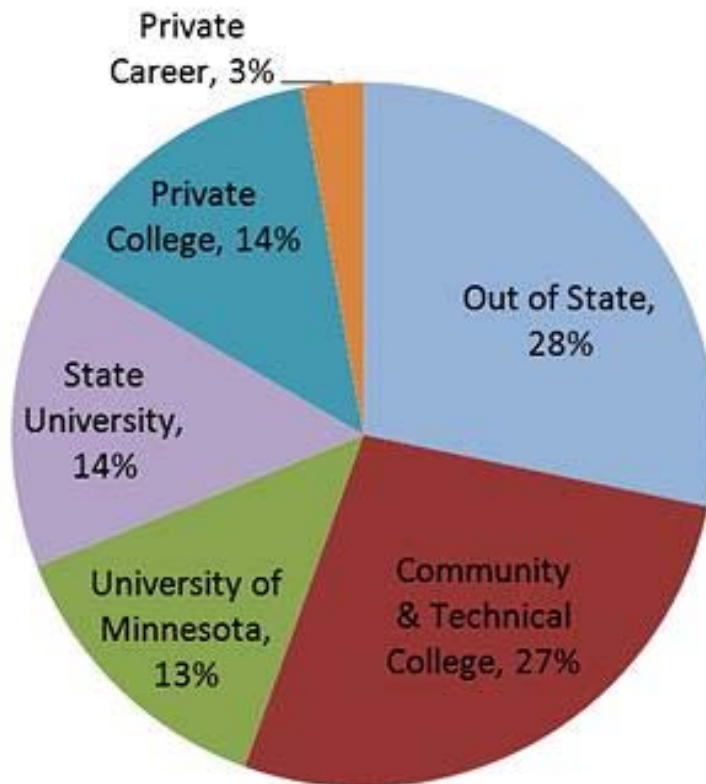


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Where Students Are Choosing to Go

There were 63,781 Minnesota high school graduates in 2010 and 45,210 enrolled in college either in Minnesota or elsewhere in fall 2010. Of those enrolling in college, 72 percent chose to [stay in Minnesota](#) and 28 percent went [out of state](#).

College Attendance of 2010 Minnesota High School Graduates in Fall 2010



Source: Minnesota Office of Higher Education (for Minnesota institutions); U.S. Department of Education, Enrollment Survey (for out of state)

College Classifications According to the Carnegie Foundation

<http://classifications.carnegiefoundation.org/descriptions/basic.php>

Associate's Colleges. Includes institutions where all degrees are at the associate's level, or where bachelor's degrees account for less than 10 percent of all undergraduate degrees.

14 categories,

Public and private

Not-for-profit and for-profit

Urban, Suburban, and Rural- serving

Mostly 2-year, some 4-year (2 years of Chem)

Unions, tenure, part-time, heavy teaching loads, enrollment rollercoaster

Feb 2013 “University Chronicle”:

According to MnSCU from a head count done last fall, Bemidji experienced a decline of 6.4 percent, Moorhead declined 4.8 percent, and SCSU enrollment declined 4.5 percent.

“Schools and universities in the Twin Cities are either holding their own, or increasing in enrollment numbers,” Devinder Malhotra, provost and vice president of academic affairs of SCSU, said.

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31 institutions, 54 campuses, 180,000 students



Minnesota
STATE COLLEGES
& UNIVERSITIES

Doctorate-granting Universities. Includes institutions that awarded at least 20 research doctoral degrees during the update year (excluding doctoral-level degrees that qualify recipients for entry into professional practice, such as the JD, MD, PharmD, DPT, etc.)



[RU/VH: Research Universities \(very high research activity\)](#) (108, U of M, Big 10)

[RU/H: Research Universities \(high research activity\)](#)(98, U of Ohio, Kansas St.)

[DRU: Doctoral/Research Universities](#) (91, Marquette, Brigham Young)

Workloads and activities?



Master's Colleges and Universities. Generally includes institutions that awarded at least 50 master's degrees and fewer than 20 doctoral degrees during the update year



[Master's/L: Master's Colleges and Universities \(larger programs\)](#) (412; Mkto, St. Cloud)

[Master's/M: Master's Colleges and Universities \(medium programs\)](#) (185; SW St.)

[Master's/S: Master's Colleges and Universities \(smaller programs\)](#) (128; Bemidji St)

Workloads and activities?



Carleton College, Minnesota



Online College of Arts and Sciences, The Cloud

Baccalaureate Colleges. Includes institutions where baccalaureate degrees represent at least 10 percent of all undergraduate degrees and where fewer than 50 master's degrees or 20 doctoral degrees were awarded during the update year.

[Bac/A&S: Baccalaureate Colleges—Arts & Sciences](#) (270 schools)

[Bac/Diverse: Baccalaureate Colleges—Diverse Fields](#) (391 schools)

[Bac/Assoc: Baccalaureate/Associate's Colleges](#) (147 schools- many “for-profit”)

Workloads and activities? Research? ACS certification

Special Focus Institutions. Institutions awarding baccalaureate or higher-level degrees where a high concentration of degrees (above 75%) is in a single field or set of related fields.

Spec/Medical: Medical schools and medical centers

Spec/Health: Other health profession schools

Spec/Eng: Schools of engineering

Spec/Tech: Other technology-related schools

Spec/Faith: Theological seminaries, Bible colleges, and other faith-related institutions

Spec/Bus: Schools of business and management

Spec/Arts: Schools of art, music, and design

Spec/Law: Schools of law

Spec/Other: Other special-focus institutions

Tribal Colleges. Colleges and universities that are members of the American Indian Higher Education Consortium, as identified in IPEDS Institutional Characteristics.

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A BIG Question:

Will there be work when you're ready to work?



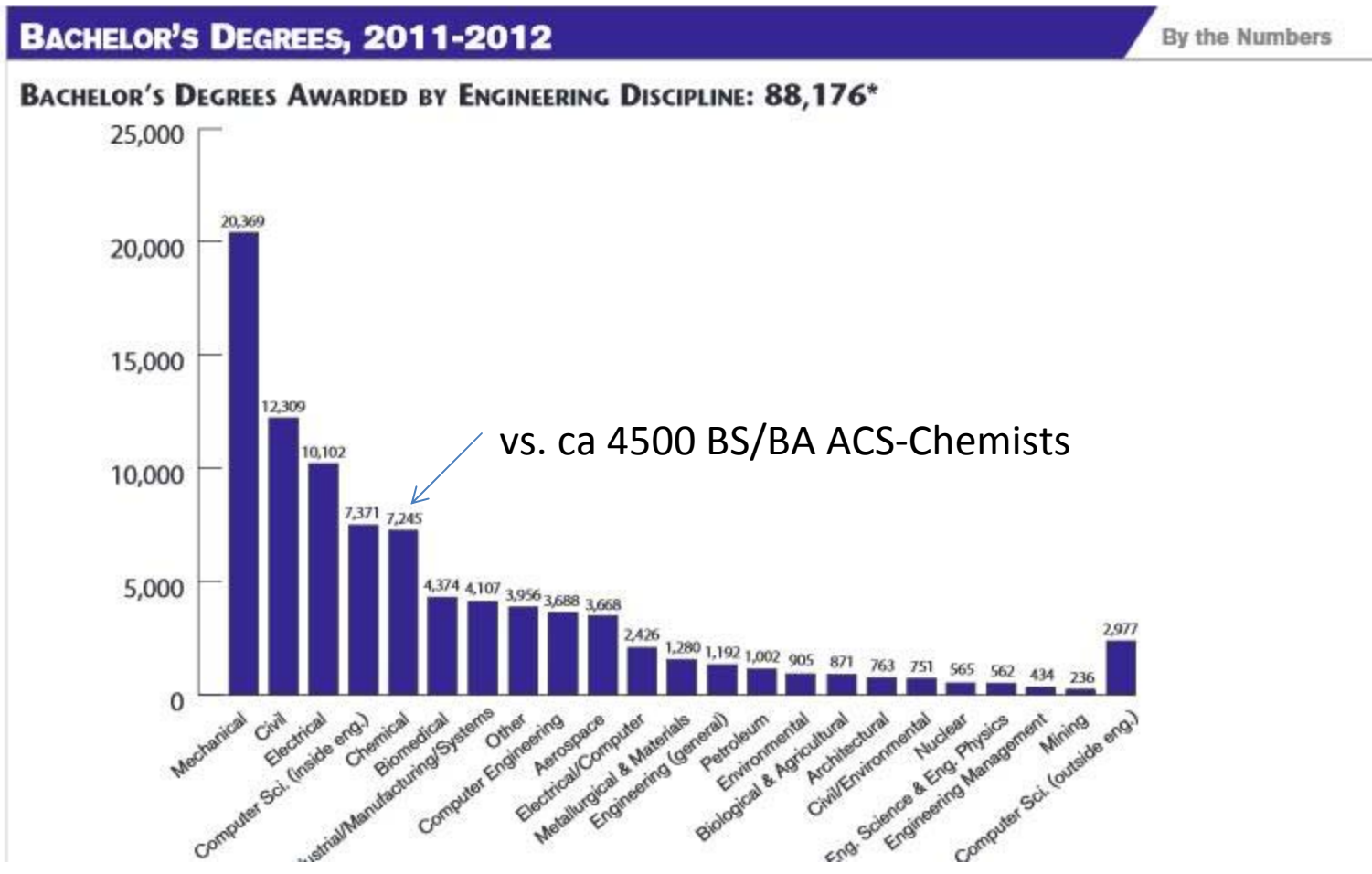
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Chemistry Degrees 1970-2009

Year	Certified BS/BA Programs	Certified BS/BA Grads	New PhDs
1970	415	3828	2145
1975	526	3897	1781
1980	554	4170	1561
1985	579	4021	1806
1990	599	3213	2131
1995	614	3971	2127
2000	619	4150	1982
2005	635	3924	2064
2008	647	4865	2362
2009	653	5030	2543

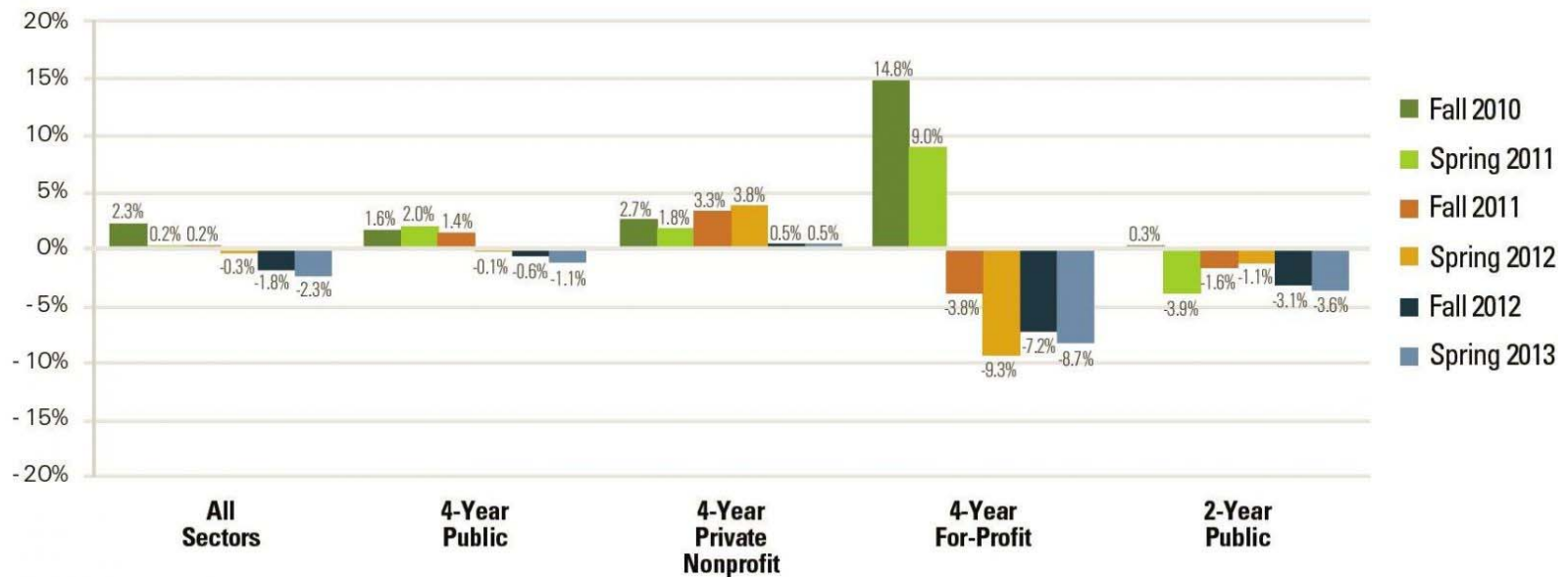
<https://portal.acs.org/> , Pre-2000 data from C&E News May issues

Engineering BS Degrees Awarded 2012



Trends in Enrollment 2010-2013

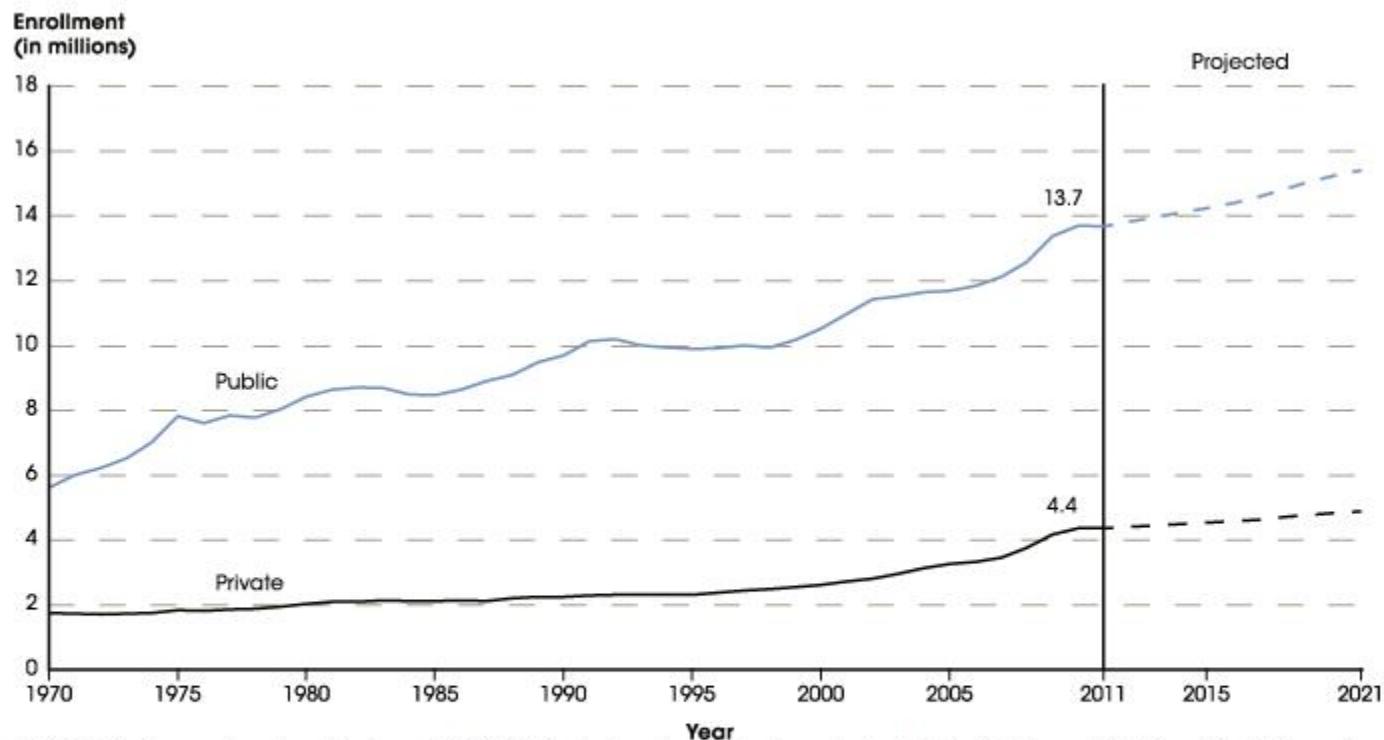
Figure 1: Percent Change from Previous Year, Enrollment by Sector (Title IV, Degree-Granting Institutions)



Inside Higher Ed, May 17, 2013

College Enrollments 1970-2021 proj.

Figure 3. Actual and projected undergraduate enrollment in degree-granting postsecondary institutions, by control of institution: Fall 1970-2021



NOTE: Projections are based on data through 2011. Data include unclassified undergraduate students. Data through 1995 are for institutions of higher education, while later data are for degree-granting institutions. Degree-granting institutions grant associate's or higher degrees and participate in Title IV federal financial aid programs. The degree-granting classification is very similar to the earlier higher education classification, but it includes more 2-year colleges and excludes a few higher education institutions that did not grant degrees. Some data have been revised from previously published figures.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Higher Education General Information Survey (HEGIS), "Fall Enrollment in Colleges and Universities" surveys, 1970 through 1985; Integrated Postsecondary Education Data System (IPEDS), "Fall Enrollment Survey" (IPEDS-EF:86-99); and IPEDS Spring 2001 through Spring 2012, Enrollment component. See *Digest of Education Statistics 2012*, tables 2 and 240 and *Digest of Education Statistics 2011*, table 214.



Occupation or as a citizen
after being in industry

matter?



there are at least 6
to University gradu

ent is research to yo



of

5) What kind of lifestyle do you aspire to? (this will depend on your choice in 3). Salary and benefits?



-Salary Expectations- Median Salaries of Academic Chemists (2012)

Table 7 displays the median salaries of academic chemists by faculty rank and length of contract.

Table 7. Change in Academic Chemist's Salaries 2011-2012 (by rank/contract length)

	Median Salary in Current Dollars		% Change from 2011	
	2011	2012	Current Dollars	Constant Dollars*
Full Professors -- 9/10 mos.	\$96,750	\$97,000	+0.3%	-2.4%
Full Professors -- 11/12 mos.	125,500	130,000	+3.6%	+0.9%
Associate Profs. -- 9/10 mos.	68,618	70,000	+2.0%	-0.7%
Associate Profs. -- 11/12 mos.	90,000	75,000	-16.7%	-19.4%
Assistant Profs. -- 9/10 mos.	59,700	60,000	+0.5%	-2.2%
Assistant Profs. -- 11/12 mos.	64,700	66,500	+2.8%	+0.1%

* Rate of inflation = 2.7%



<http://www.acs.org/content/acs/en/careers/salaries.html>

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Academic Salaries at Public R1 Universities, 2013

Compare Institutions

Compare University of Minnesota-Twin Cities with several similar institutions, or, using the "Find a college" tool below, an institution of your choice. We'll automatically highlight the highest salaries (in green) and the lowest (in red) for each faculty type across the displayed institutions.



College	Full Professors	Associate Professors	Assistant Professors	Instructors	Unranked
U Minnesota-Twin Cities	\$134,300	\$88,500	\$81,800	\$48,700	NA
U Connecticut	\$136,800	\$91,900	\$73,900	\$67,900	NA
U Tennessee-Knoxville	\$122,500	\$88,600	\$74,900	\$58,900	NA
U Colorado-Boulder	\$127,800	\$92,200	\$79,400	\$55,900	NA
Penn St U-Main	\$138,700	\$94,300	\$82,500	\$55,200	NA
U South Carolina-Columbia	\$121,600	\$83,900	\$75,100	\$50,900	NA
U Texas-Austin	\$144,000	\$92,800	\$86,000	NA	NA
Indiana U-Bloomington	\$132,000	\$88,600	\$80,400	NA	NA
U Georgia	\$109,400	\$80,900	\$76,200	\$53,300	NA
Rutgers St U-New Brunswick	\$151,000	\$101,200	\$81,700	\$50,900	NA
Florida St U	\$109,400	\$76,700	\$77,100	\$34,100	NA

Add a college to the comparison

[Compare to 5 more similar institutions](#) | [Clear the comparison group](#)

Academic Salaries 4-Year Private Colleges in Minnesota, 2013

College	Category	Full professors	Associate professors	Assistant professors	Instructors
Carleton Coll	Baccalaureate	\$119,700	\$87,400	\$72,600	
Macalester Coll	Baccalaureate	\$113,300	\$86,400	\$70,300	\$55,100
U St. Thomas	Doctoral	\$111,700	\$83,900	\$76,700	\$86,500
St. Olaf Coll	Baccalaureate	\$95,400	\$73,500	\$58,700	\$55,400
Saint John's U	Baccalaureate	\$88,400	\$71,100	\$59,900	\$57,600
Coll Saint Benedict	Baccalaureate	\$87,300	\$70,800	\$60,400	\$55,900
Coll St. Scholastica	Baccalaureate	\$86,800	\$67,500	\$57,300	\$47,900
Hamline U	Master's	\$84,900	\$64,100	\$53,300	\$51,100
Augsburg Coll	Baccalaureate	\$78,400	\$64,400	\$56,800	\$50,200
Gustavus Adolphus Coll	Baccalaureate	\$77,700	\$63,700	\$53,300	\$37,100
St. Catherine U	Master's	\$77,500	\$64,400	\$53,200	\$47,100
Bethel U	Master's	\$77,300	\$67,100	\$56,500	\$50,900
Concordia Coll	Baccalaureate	\$77,300	\$62,600	\$53,200	\$47,300
Minneapolis Coll Art & Design	Baccalaureate	\$74,600	\$61,900		\$37,500
Saint Mary's U Minnesota	Master's	\$73,800	\$61,000	\$51,500	\$46,800
Northwestern Coll	Baccalaureate	\$67,600	\$58,600	\$49,800	\$39,900

AAUP Salaries 2013—Average salaries in ranks

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

ACS data 2012: <http://www.acs.org/content/dam/acsorg/careers/salaries/surveys/salaries-2012-center-article.pdf>

Engineers Make Bigger Bucks

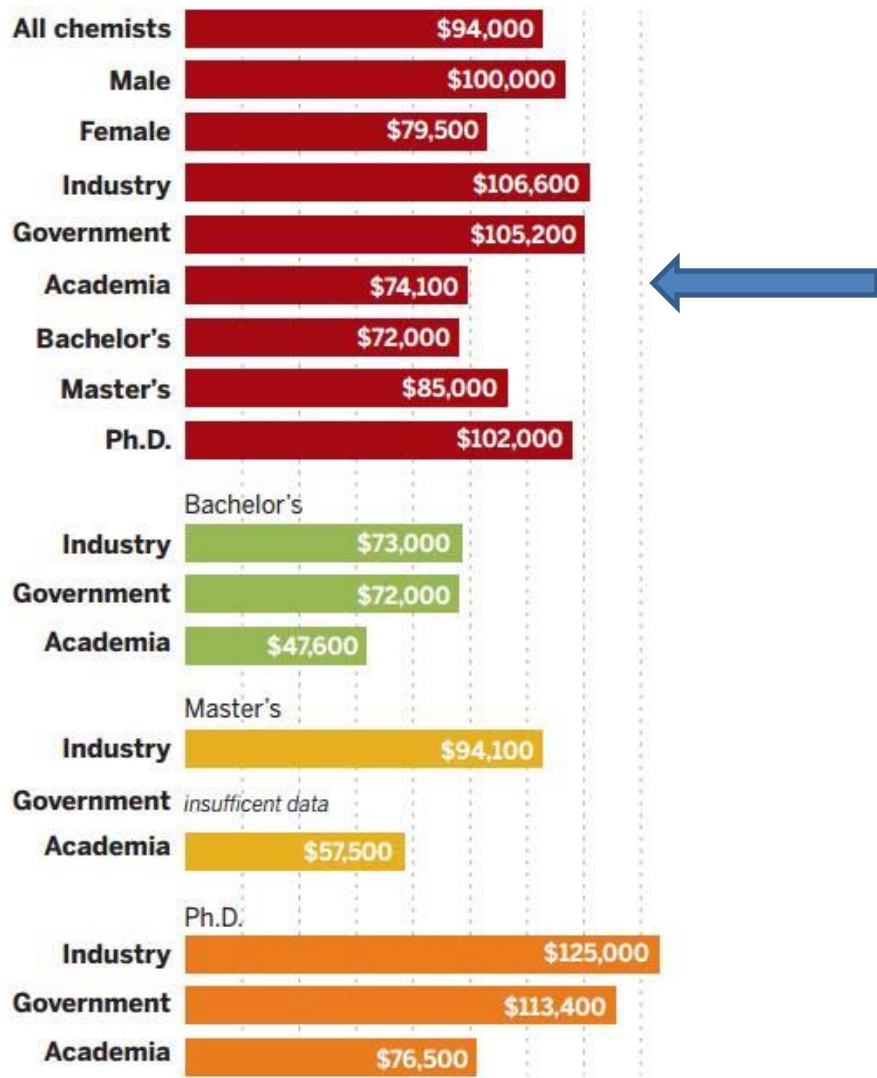
Table 2. Median Salaries for Chemists and Chemical Engineers 2012

	Chemists	Chemical Engineers	Percent Difference
All Chemists	\$92,000	\$114,000	+23.9%
Degree			
Bachelor's	73,850	93,000	+25.9%
Master's	85,000	120,000	+41.2%
Doctorate	100,613	120,000	+19.3%
Employer			
Industry	106,000	120,000	+13.2%
Government	104,000	114,500	+10.1%
Academic	71,158	91,000	+27.9%
Age			
20-29	47,000	65,000	+38.3%
30-39	76,163	88,050	+15.6%
40-49	92,200	122,000	+32.3%
50-59	108,000	132,360	+22.6%
60-69	108,466	138,500	+27.7%

<http://www.acs.org/content/acs/en/careers/salaries.html>

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MEDIAN BASE SALARIES Industry and government salaries outstripped those in academia.



NOTE: Median annual base salaries for chemists employed full-time as of March 1, 2013.
SOURCE: ACS salary and employment survey 2013

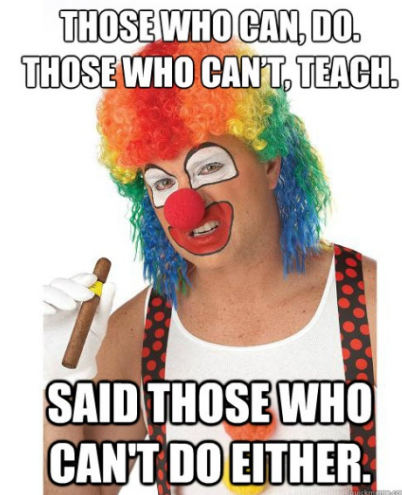
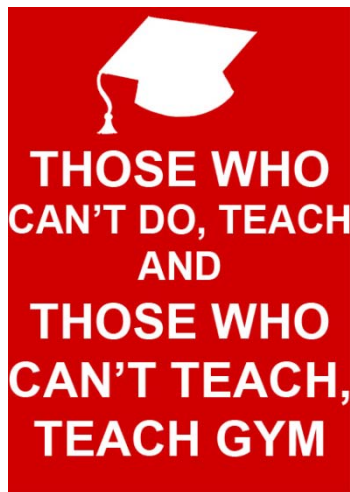


Those that can, do. Those that can't do, teach.



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Those that can teach, *should* teach.



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Average Salaries of Chemists 2002 and 2008 in CPI-adjusted 2010 Dollars

Year	Industry BS	Industry Ph.D.	Asst Prof.	Full Prof.
2002	\$70,400	\$112,000	\$57,500	\$96,600
2008	\$74,700	\$115,000	\$56,800	\$91,700

Source of pre-adjusted data: American Chemical Society
(ACS website <https://portal.acs.org/>)

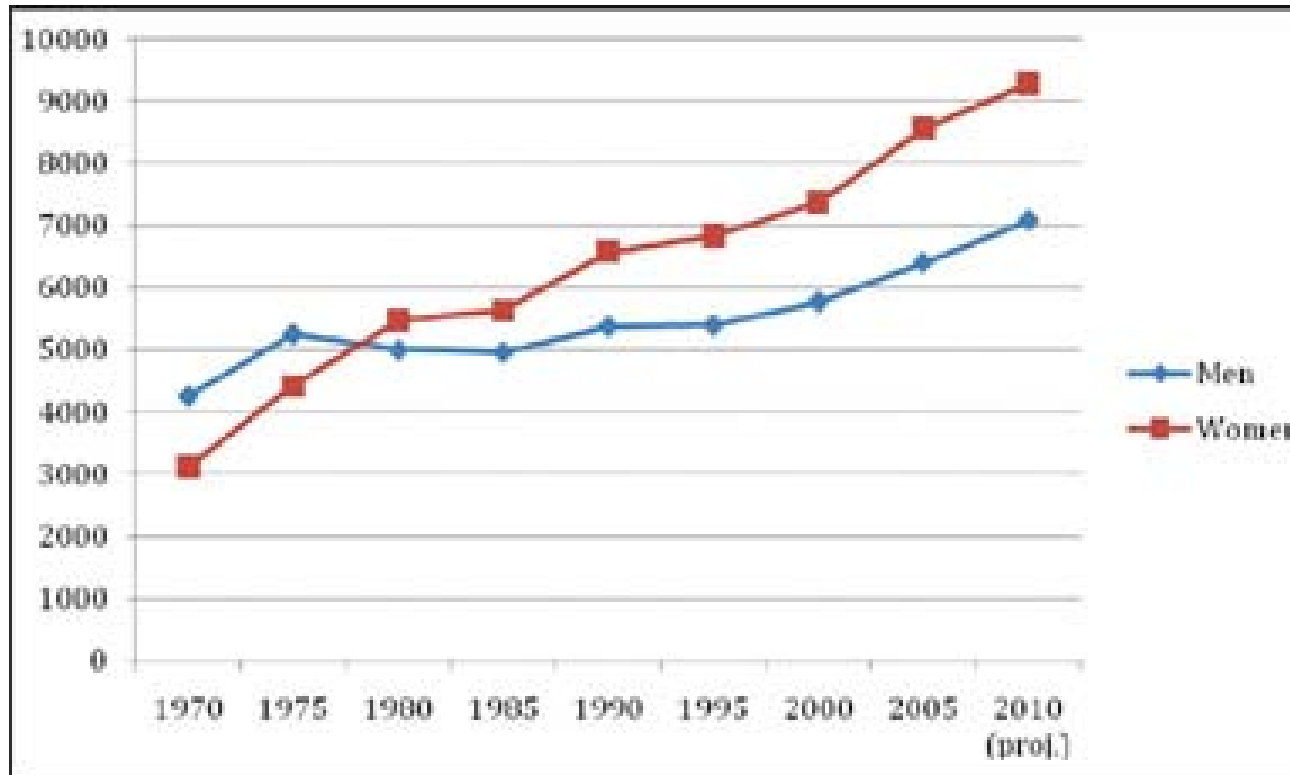
SALARIES FOR ALL CHEMISTS BY EXPERIENCE

Median salaries begin to fall after about 35 years of experience

\$ THOUSANDS	YEARS SINCE BACHELOR'S DEGREE									ALL ^a
	2-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40+	
ALL CHEMISTS	\$47.0	\$63.0	\$72.6	\$85.0	\$95.0	\$101.0	\$110.0	\$105.0	\$107.0	\$90.0
BY GENDER										
Men	47.0	65.0	78.0	89.0	99.0	105.0	113.4	108.6	110.5	96.0
Women	46.8	60.0	65.1	74.1	83.0	93.0	81.4	95.0	81.0	72.0
BY DEGREE										
Bachelor's	46.0	55.0	60.8	72.0	88.0	85.0	90.5	84.0	85.0	67.3
Master's	id	61.0	72.5	83.5	82.0	85.5	91.7	92.6	91.1	80.6
Ph.D.	id	75.4	79.0	88.2	103.0	112.0	120.0	120.0	114.0	100.0
BY EMPLOYER										
Industry	47.8	65.0	81.5	95.6	106.6	111.0	119.0	115.5	116.7	100.0
Government	id	61.9	85.0	90.6	97.9	95.0	109.3	98.3	130.0	94.4
Academia	35.3	51.0	56.5	61.8	64.7	73.0	81.7	84.5	96.4	69.0

NOTE: Median full-time salaries. **a** Respondents giving their age. **id** = insufficient data to be meaningful. **SOURCE:** ACS salary survey 2009

College Enrollment USA 1970-2010 (Thousands)



Source: National Center for Educational Statistics, *2008 Condition of Education*, <http://nces.ed.gov/programs/coe/2009/section1/table-hep-1.asp>

Updated Carnegie Classifications Show Increase in For-Profits, Change in Traditional Landscape

January, 2011

2005: 4150 schools, 2010: 4633 schools



Trends:

- Increase in number of for-profits (77% of newly-added schools!) (tenure?)
- Increase in highly-specialized schools (business, health, law)
- Decrease 5% in schools offering >60% bachelors degrees in trad arts & sciences
- Substantial increase in Associate's schools granting <10% Bachelors degrees (up 50% since 2005), AA/BS schools granting >50%, up 23% since 2005
- Growth of public and private non-profits is slower than for-profits

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<http://www.carnegiefoundation.org/newsroom/press-releases/updated-carnegie-classifications>