



SCIENTISTS AND ENGINEERS: VITAL STATISTICS

Current Numbers, Recent Growth

- In 2005, 3,246,000 workers in professional and related occupations were employed in computer and mathematical occupations, while 2,558,000 were employed in engineering occupations and 1,087,000 in life and physical science occupations. Together they accounted for 24% of the professional labor force.¹
- From 1995–2005 the total number of jobs in the U.S. increased by 13.5%, while*:
 - Aerospace engineers increased by 63%, and civil engineers by almost 83%.²
 - Mechanical engineers increased by 19.6%.³
 - Among the natural sciences, the number of chemists and materials scientists increased 15%, and environmental and geoscientists grew by 93.7%.⁴
 - The number of medical scientists increased by almost 200%.⁵
 - Survey and mapping technicians increased by 112%, and the number of drafters increased by 27%.⁶

2004–2014 Job Projections Reflect Offshoring of High Tech and IT Jobs

The latest projections by the U.S. Department of Labor, Bureau of Labor Statistics (BLS) show that due to the increasing exodus of highly skilled jobs overseas, the vast majority of occupations expected to experience the largest job growth from 2004–2014 are low-wage service occupations. This is in sharp contrast to the 2000–2010 projections, which predicted an IT boom:

- In the 2000–2010 projections, highly skilled computer occupations accounted for the seven most rapidly growing occupations, and eight of the top 10. These occupations were also expected to add the most jobs—some two million—from 2000–2010. In contrast, only two computer occupations—network systems and data communications analyst, and computer software engineers (applications)—are now ranked among the seven occupations expected to grow most rapidly from 2004–2014.⁷
- BLS projected that from 2000–2010, 1.53 million high tech jobs would be generated by the seven most rapidly growing occupations, an average annual increase of 153,000 jobs. Now BLS anticipates an average annual increase of only 34,800 high tech jobs from the seven occupations expected to grow most rapidly from 2004–2014.⁸
- Comparing the 10 most rapidly growing occupations from the 2000–2010 projection period with the 2004–2014 projections for those same high-tech occupations, the following number of jobs are missing:
 - 15,800 computer software engineers, applications
 - 13,800 computer software engineers, systems software
 - 37,100 computer support specialists
 - 1,700 desktop publishers
 - 8,000 network and computer systems administrators

* Note: Due to 2003 changes in BLS occupational classification reporting, comparative 1994–2004 figures are approximations calculated using BLS's "Conversion factors for the Census occupational and industry classifications, Table 5: *Distribution of employment from the 1990 to the 2002 Census Occupational Classification by detailed occupation*" (<http://www.bls.gov/cps/cpsoccind.htm>).

- 3,000 database administrators
- In all, a total of 1.3 million fewer high-tech jobs are anticipated in the 2004–2014 period—just 72% of the 1.8 million high-tech jobs originally projected in 2000 to be created by the ten most rapidly growing occupations.⁹
- Only one IT job’s projected numbers increased in 2004–2014: Network systems analyst and data communications analysts, the projections for which exceeded those for 2000–2010 by an annual average of 3,400.¹⁰
- BLS projections for 2000–2010 put two IT jobs among the top ten for largest (numerical) job growth—computer support specialists and computer software engineers. For the adjusted 2004–2014 forecast, there are no high tech jobs among the 10 occupations expected to create the most new jobs.¹¹
- It should be noted that projections were also put out for 2002–2012; these estimates were similar to the more recent 2004–2014 projections. While both of the most recent projections are striking in their difference from the 2000–2010 projections, the 2004–2014 projections do show a slight rebound in the number of high-tech jobs compared with the 2002–2012 estimates.

Other Employment Changes, 2004–2014

- Projected increases in the life, physical, and mathematical science occupations in the 2004–2014 projections are similar to previous estimates. Life scientists should increase by almost 21% and physical scientists by about 12%. Mathematical scientists are projected to increase by 9.7%. The largest percentage increases in these areas are expected in medical science (34%), epidemiology (26%); actuaries (23.2%); biochemists and biophysicists (21%); and environmental scientists (17%).¹²
- Employment growth for engineers has rebounded significantly from the previous 2002–2012 estimates. Jobs in the engineering field in general are projected to increase 13.4% between 2004 and 2014, just slightly more than the 13% anticipated for the work force as a whole, and almost double the 7.3% increase expected in the previous projections. The greatest increases are expected in biomedical engineering (30.7%) and environmental engineering (30%). Losses are expected in petroleum engineering and mining and geological engineering, and marine engineering.¹³
- Engineering technicians, excluding drafters, will increase by 12%; drafters will increase by 5.3%.¹⁴
- Life, physical, and social science technicians are projected to increase by 14.4%. Biological technicians are expected to increase by 17.2%.¹⁵

Median Weekly Earnings Vary in 2005

- Median weekly earnings for engineers ranged from a high of \$1,405 for computer hardware engineers to a low of \$1,161 for industrial engineers in 2005.¹⁶
- For mathematical and computer scientists, median weekly earnings ranged from a high of \$1,706 for computer and information research scientists to a low of \$823 for computer support specialists. Among natural scientists, physicists earned a high of \$1,782, while food scientists and technologists earned the low of \$524.¹⁷
- Among engineering and related technologists and technicians, aerospace engineering and operations technicians earned the most (\$1,094) while environmental engineering technicians earned the least (\$719).¹⁸

- Among science technicians, forensic science technicians earned the most (\$1,060), while agricultural and food science technicians earned the least (\$425).¹⁹
- Women and minorities are more concentrated in the lower paying technical occupations.²⁰

Women's Situation

Women's participation in science, engineering, and technical occupations increased from 1995–2005, although they are still underrepresented in many fields, particularly in mathematical and computer science and engineering.

- In 2005, female natural scientists comprised 39% of the field. In contrast, women represented 46.4% of the overall labor force in 2005, and accounted for over 56% of the professional labor force.²¹
- Women are well-represented in medical and biological sciences, where they were 46% and 49%, respectively, of the scientists in 2005. However, they accounted for less than 23% of environmental and geoscientists in 2005.²²
- In 2005, 12.8% of engineers were women. The largest proportion of women was in industrial engineering, where women were 15% of the field. On the low end, only 5.8% of mechanical engineers were women.²³
- Over 20% of engineering technicians were women in 2005, along with 28% of chemical technicians.²⁴
- The percentage of women earning bachelor's, master's, and doctoral degrees in the sciences, engineering, and related technologies increased from 1994–2001. In 2001 as in 1994, women earned the majority of bachelor's and master's degrees in biological/life sciences.²⁵
- In almost every field, men's weekly median earnings were approximately 20% higher than women's.²⁶

Blacks and Hispanics: Underrepresented and Underpaid

Blacks and Hispanics are severely underrepresented in science and engineering:

- In 2005, Blacks were 10.8% of the labor force, but only 6% of natural scientists, 6.9% of math and computer scientists, and 4.8% of engineers.²⁷
- Blacks held 8.9% of engineering technician positions in 2005; they were much better represented among chemical technicians, where they constituted 18.8% of this (relatively lower paying) occupation.²⁸
- Participation in science and engineering occupations is even lower for persons of Hispanic origin. Hispanics were 13.1% of the labor force in 2005, but only 3% of natural scientists, 5.3% of math and computer scientists, and 5.8% of engineers.²⁹
- Hispanics were more equally represented in technician and technologist occupations, at 7.9% of chemical technicians, and over 10% of engineering technicians in 2005.³⁰
- In nearly every science and engineering occupation, white men's median weekly earnings were higher in 2001 than those of Black men and women, Hispanic men and women, and white women.³¹
- Among math and computer scientists, white men earned 11.7% more than Black men, almost 19% more than Hispanic men, 23% more than white women, 29.4% more than Black women, and 23.1% more than Hispanic women.³²

- Among scientists and engineers, Blacks and Hispanics were more likely than whites to be unemployed in 2002. Among technicians and technologists, Blacks were more likely to be unemployed than either whites or Hispanics.³³

Union Membership

- Union membership fluctuated between 1995 and 2005 within these occupations, increasing slightly among scientists and declining slightly among engineers and technicians.³⁴
- In 2005, the highest union membership rate in the sciences was among conservation scientists and foresters (18.2%); in engineering, among environmental engineers (16.4%); and among biological technicians (21%) and engineering technicians (17.4%).³⁵
- Among those technologists and technicians for which data is available (engineering, surveying, and mapping technicians), unionized workers earned an average of \$28.52 an hour, compared to an average hourly wage of \$19.18 for non-unionized workers. This amounts to a wage premium of over 48% for those belonging to unions.³⁶
- In some cases, scientists and engineers who are non-union earn more than those who are union members. This is because a far greater proportion of scientists and engineers in government and academia are organized than in the higher-paying private industry, where most scientists and engineers work.³⁷

¹ U.S. Department of Labor, Bureau of Labor Statistics, <http://www.bls.gov/cps/home.htm#annual>, Table 11.

²⁻⁶ U.S. Department of Labor, Bureau of Labor Statistics, *Ibid; Employment and Earnings*, Vol. 40, No. 1, Table 11.

⁷⁻¹⁵ Hecker, Daniel, "Occupational Employment Projections to 2010", U.S. Department of Labor, *Monthly Labor Review*, November 2001; "Occupational Employment Projections to 2012", U.S. Department of Labor, *Monthly Labor Review*, February 2004; "Occupational Employment Projections to 2014", U.S. Department of Labor, *Monthly Labor Review*, November 2005.

¹⁶⁻²⁰ U.S. Department of Labor, Bureau of Labor Statistics, <http://www.bls.gov/cps/home.htm#annual>, Table 39;

U.S. Department of Labor, Bureau of Labor Statistics, http://www.bls.gov/oes/oes_dl.htm.

²¹⁻²⁴ U.S. Department of Labor, Bureau of Labor Statistics, <http://www.bls.gov/cps/home.htm#annual>, Table 11; Vol. 40, No. 1, Table 11.

²⁵ National Science Foundation, Scientists and Engineers Statistical Data System (SESTAT),

www.nsf.gov/sbe/srs/srsdata.htm#SESTAT.

²⁶ U.S. Department of Labor, Bureau of Labor Statistics, <http://www.bls.gov/cps/home.htm#annual>, Table 39.

²⁷⁻³⁰ *Employment and Earnings*, <http://www.bls.gov/cps/home.htm#annual>, Table 11.

³¹⁻³³ Scientists and Engineers Statistical Data System (SESTAT), *op. cit.*

³⁴⁻³⁷ BNA Plus, *Union Membership and Earnings: Compilations from the Current Population Survey*, 2006 edition.

The Department for Professional Employees, AFL-CIO (DPE) comprises 23 AFL-CIO unions representing over four million people working in professional, technical and administrative support occupations. DPE-affiliated unions represent: teachers, college professors, and school administrators; library workers; nurses, doctors, and other health care professionals; engineers, scientists, and IT workers; journalists and writers, broadcast technicians, and communications specialists; performing and visual artists; professional athletes; professional firefighters; psychologists, social workers and many others. DPE was chartered by the AFL-CIO in 1977 in recognition of the rapidly-growing professional and technical occupations.

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