



by Carolyn F. Shettle

Division of Science Resources Studies

# ISSUE BRIEF

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*Over the last two decades, the Ph.D. unemployment rate has remained below the general population rate and has exhibited less fluctuation than the rates for other educational levels.*

## Electronic Dissemination

SRS data are available through the World Wide Web (<http://www.nsf.gov/sbe/srs/stats.htm>) For NSF's Telephonic Device for the Deaf, dial 703-306-0090. If you are a user of electronic mail and have access to the internet, you may order publications electronically. Send requests to [pubs@nsf.gov](mailto:pubs@nsf.gov). In your request, include the NSF publication number and title, your name, and a complete mailing address.

## S&E PH.D UNEMPLOYMENT TRENDS: CAUSE FOR ALARM?

**H**ow high is the unemployment rate for people with doctoral degrees in science and engineering (S&E)? Is it unusually high? Will current and future graduate school students have trouble finding jobs? These questions are among those being discussed by science and graduate education policy makers, as well as by individuals in — or planning to enter — the doctoral science and engineering job market and those responsible for programs serving them.

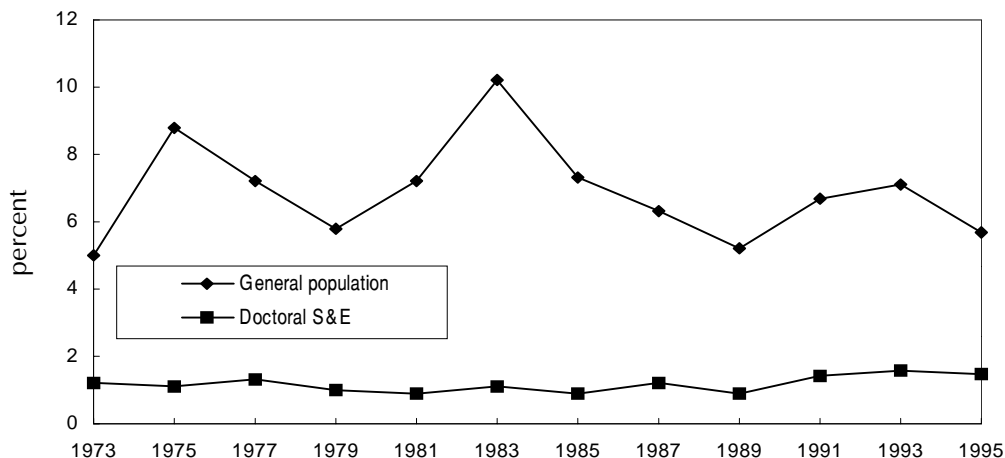
Statistical information about unemployment among persons with U.S. S&E doctorates under age 76 is presented here. Additional information on such related topics as involuntary-part-time-employment, involuntary-out-of-field employment, unemployment within population subgroups, and information on those with degrees from foreign institutions is needed for a comprehensive understanding of the doctoral S&E labor market.<sup>1</sup>

### How high are unemployment rates for doctoral scientists and engineers in the 1990s?

The April 1995 doctoral S&E unemployment rate (1.5 percent) was considerably below the unemployment rate in the total labor force (5.7 percent). There was virtually no change in the doctoral S&E unemployment rate between 1993 and 1995, even though the unemployment rate for the total population declined from 7.1 percent during this period (Chart 1).

Despite the relatively low rate of unemployment in the doctoral population compared to the total population, the 1993 unemployment rate (1.6 percent) was the highest ever observed in the biennial Survey of Doctorate Recipients (SDR), beginning in 1973. This is consistent with the observations of many others that unemployment in the doctoral

**Chart 1. Unemployment rates of persons with doctoral degrees in science and engineering and U.S. civilian labor force 16 years and older: 1973-95**



**SOURCE:** Doctoral statistics from National Science Foundation/SRS, Survey of Doctorate Recipients. General population figures for April of each year from Bureau of Labor Statistics, Current Population Survey.

<sup>1</sup> Information on many of these topics is available from current SRS publications. This Issue Brief presents information on all Ph.D.s under age 76, in contrast to "Labor market Conditions for Recent Ph.D. Recipients: 1993 to 1995 Changes Vary Greatly by Field," which focuses on recent degree recipients.

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science and engineering population was unusually high in the early 1990s.

**Do trends in unemployment rates among those with S&E doctorates mirror those in the general population?**

Between 1973 and 1995, there was no apparent association between unemployment rates for the doctoral science and engineering population and those for the total population, i.e., periods of high (or low) unemployment in the total population were not necessarily periods of high (or low) unemployment in the doctoral population. Further, the Ph.D. unemployment rate exhibited less fluctuation than the unemployment rates for other educational levels.

**What is the relationship between educational level and unemployment?**

In 1993, the unemployment rates were 1.6 percent for those whose highest degree was a doctorate in science or engineering from a U.S.

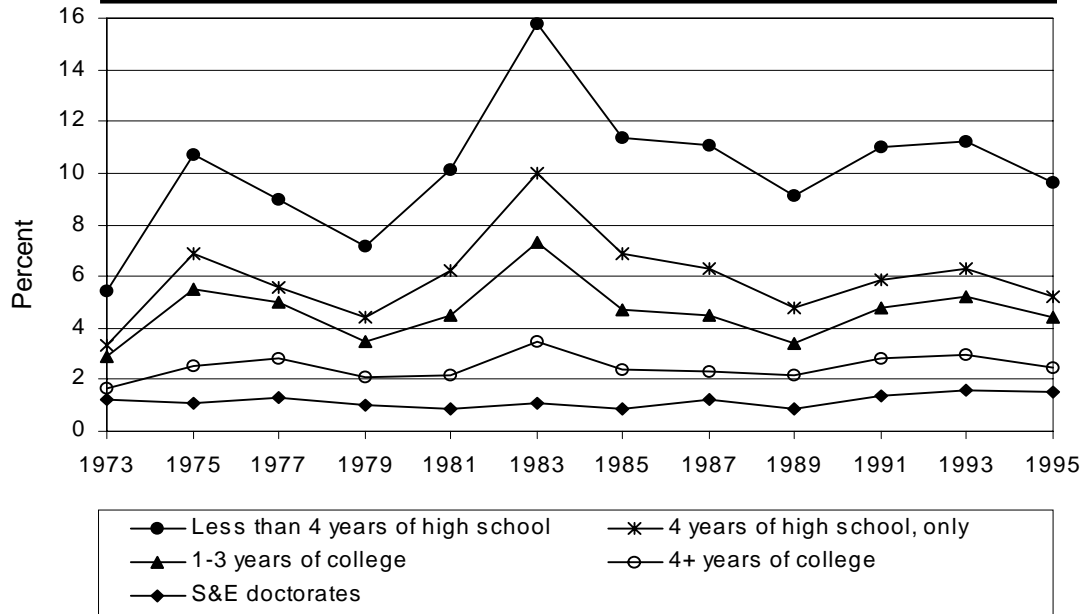
institution; 2.7 percent for those whose highest degree was a master's in science or engineering; and 4.0 percent for those whose highest degree was a bachelor's degree.

The relatively low rate of unemployment in the doctoral S&E population is consistent with the fact that unemployment rates decrease as educational level rises in the general population (Chart 2). Between 1973 and 1995, there was a strong negative correlation between educational level and unemployment.

Not only did fluctuations in unemployment rates decrease with increasing education, but there was also less fluctuation in unemployment rates for the doctoral population than for other educational groups between 1973 and 1995. The ratio of maximum to minimum unemployment rates during this period was 1.8 for the doctoral population, 2.1 for the college-educated population, and approximately 3.0 for those with

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**Chart 2. Unemployment rates of persons with doctoral degrees in science and engineering and persons 25 to 64 years of age in the overall population, by educational level: 1973-95**



**NOTE:** Data for the doctorate population in 1991 and 1993 are not strictly comparable to each other or to those in preceding years.

**SOURCES:** Doctoral statistics from National Science Foundation/SRS, Survey of Doctorate Recipients. General population figures from Bureau of Labor Statistics, Current Population Survey.

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no more than a high school education.

### Key Terms

**Unemployed:** on lay off or not employed but searching for work (during the four week period prior to the reference date).

**Labor Force:** unemployed plus employed individuals.

**Unemployment Rate:** percent of the labor force who are unemployed.

**The Survey of Doctorate Recipients (SDR):** a survey of individuals under age 76 who received a research doctorate in science or engineering from a U.S. university at least ten months prior to the survey.

### Will future graduate students have trouble finding jobs?

As they enter graduate school, students would like to know what the job market will be like in 10 years. However, there is a negligible association between unemployment in the doctoral science and engineering labor force and unemployment in the general population, so predicting doctoral science and engineering unemployment requires specialized prediction models.

Even those specialized models are not yet thought to be adequate for projecting long term unemployment. According to the *Report of the Ad Hoc Working Group on the Supply of Science, Engineering and Mathematics (SEM) Professionals (1993)*, "It is not currently possible and will probably never be possible to predict with a high degree of accuracy shortages or surpluses of scientists and engineers several years into the future." A similar sentiment was echoed in a more recent publication by Tobias et. al. (1995), "Given the time lag in producing scientists, . . . it is particularly hard to predict, no less adjust, supply and demand." (p. 16).

### References and Related Publications:

*Ad Hoc Working Group on the Supply of Science, Engineering and Mathematics (SEM) Professionals, Federal Coordinating Council for Science, Engineering, and Technology (FCCSET)*, Report, September 9, 1993.

Bureau of Labor Statistics, data from the Current Population Survey, (downloaded data, special tabulations, and information in U.S. Department of Labor, *Report on the American Workforce*, 1994.)

National Science Foundation, *Characteristics of Doctoral Scientists and Engineers in the United States: 1987, 1989, 1991, 1993, and 1995* (NSF 88-331, 91-317, 94-307, 96-302 and forthcoming) plus data from 1993 SESTAT data base (<http://www.nsf.gov/sbe/srs/stats.htm>).

Tobias, Sheila, Daryl E. Chubin, and Kevin Aylesworth, *Rethinking Science as a Career: Perceptions and Realities in the Physical Sciences*, Research Corporation, Tucson, Arizona, copyright, 1995.

For more information on doctoral unemployment, see NSF's forthcoming publication, *Who is Unemployed? Factors Affecting Unemployment Among Individuals with Doctoral Degrees in Science and Engineering* to be released in hard copy and on the Web (<http://www.nsf.gov/sbe/srs/stats.htm>) or contact:

**Dr. Carolyn F. Shettle**  
**National Science Foundation**  
**Division of Science Resources Studies**  
**4201 Wilson Boulevard, Suite 965**  
**Arlington, VA 22230**

**Phone (703) 306-1780, ext. 6906**  
**Internet: cshettle@nsf.gov**

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