Nuclear Engineering Enrollments & Degrees Survey Data 50-Year Trend Assessment, 1966-2015

March 2017

Introduction

The Nuclear Engineering Enrollments and Degrees Survey has been conducted by the Oak Ridge Institute for Science and Education and its predecessors since 1972, with the first report including historical degree data dating back to 1966. The annual survey includes programs offering undergraduate or graduate majors in nuclear engineering or other engineering course work equivalent to nuclear engineering.

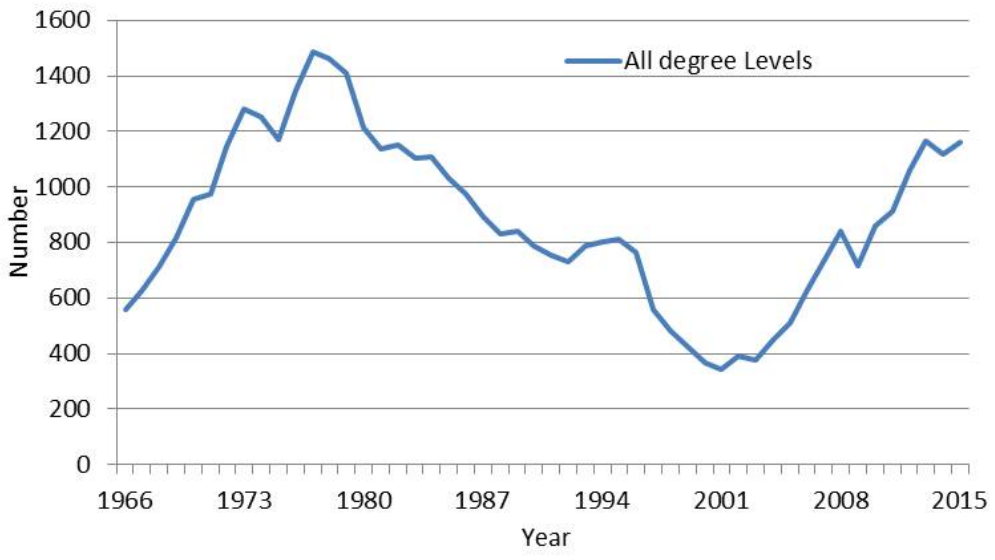
This historical perspective is timely since the Energy Information Administration (EIA) projected nuclear generation to modestly decline over the 2017-2040 time period. The EIA also projects a faster decline in nuclear generation beyond 2040 as existing plants are assumed to be retired after reaching the age of 60. The U.S. nuclear energy renaissance over the last several years appears to be winding down as long-time nuclear power plants such as Vermont Yankee and Kewaunee Power Station have shut down, while construction of new plants continues at lower levels than originally anticipated. The impact of relatively inexpensive natural gas—coupled with a growing renewable energy generating capacity and lackluster growth in electricity demand from the moderately-growing U.S. economy—have taken a toll on nuclear power plant economics.

Degrees

In Figure 1, the total number of nuclear engineering degrees awarded annually is shown. In 1966, 66 academic programs reported over 560 total nuclear engineering degrees compared to approximately 1,160 nuclear engineering degrees reported by 35 U.S academic programs in 2015. Comparing the beginning point of 1966 to the end point of 2015, the production of nuclear engineering degrees has more than doubled. However, there has been significant volatility in the number of nuclear engineering degrees awarded annually over the 50-year period, which can be illustrated further by disaggregating the degree level.

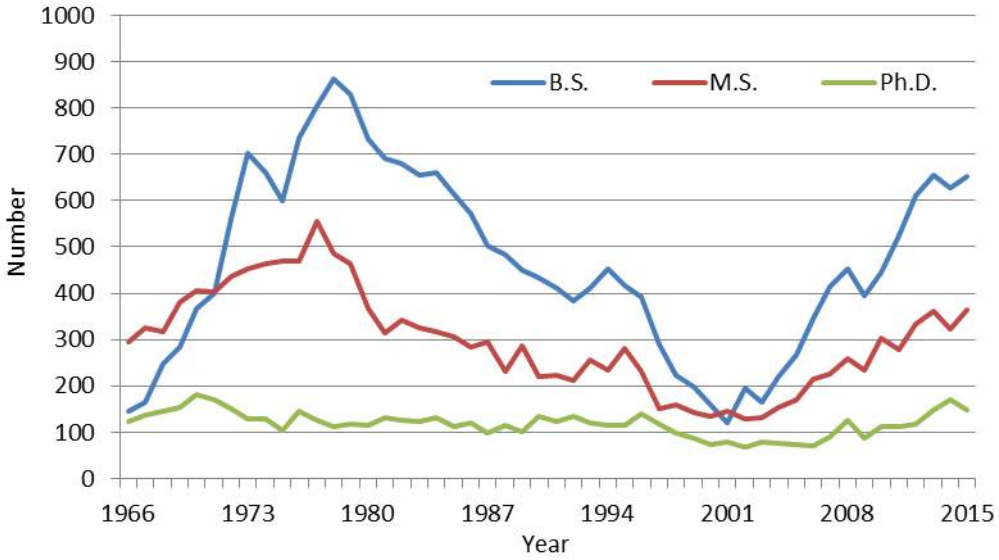
Figure 2 shows that the number of bachelor's degrees awarded in nuclear engineering peaked in 1978 at nearly 865 degrees. The lowest number of nuclear engineering

FIGURE 1 | Nuclear Engineering Degrees, 1966-2015



Source: Oak Ridge Institute for Science and Education.

FIGURE 2 | Nuclear Engineering Degrees, by Degree Level, 1966-2015



Source: Oak Ridge Institute for Science and Education.

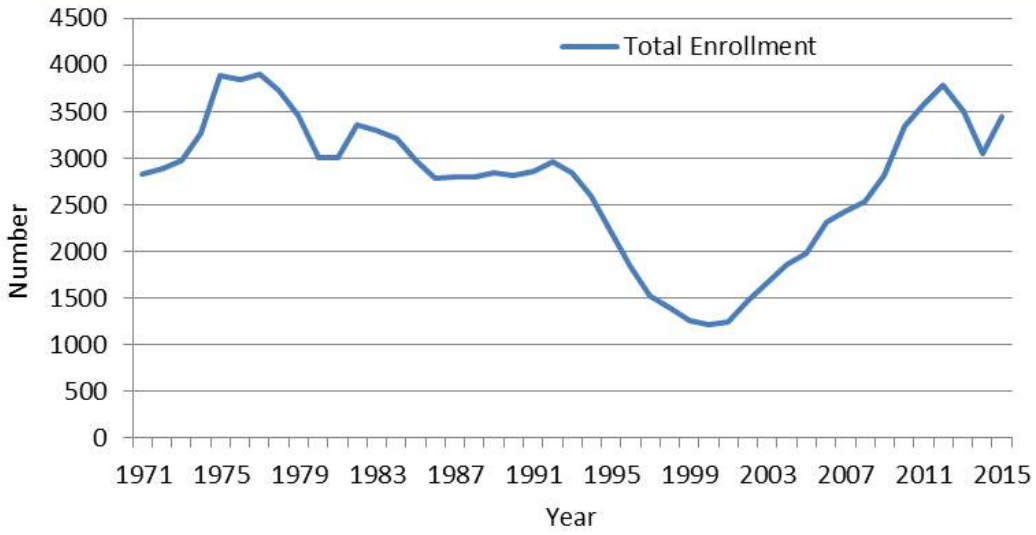
bachelor's degrees awarded over the 1966-2015 period by U.S. academic programs occurred in 2001 at 120 degrees. Since 2001, the number of bachelor's degrees awarded annually had climbed back above 600 by 2012. Exhibiting a similar pattern, master's degrees awarded in nuclear engineering increased from nearly 300 master's degrees awarded in 1966 to over 550 in 1977, only to fall to 130 master's degrees awarded in 2002. Since then, the number of master's degrees in nuclear engineering awarded has rebounded and has exceeded 300 annually since 2012. Significantly less volatile over the period 1966-2015, the number of Ph.D. degrees awarded in nuclear engineering has averaged 118 annually, with a low point of approximately 65 in 2002 and a high point of over 180 in 1970.

Enrollment

Survey data on enrollment of undergraduate (juniors and seniors) and graduate students are also available for the time period 1971-2015. In Figure 3, the total enrollment of junior, senior, and graduate students are presented. Total enrollment exhibits a similar trend to the total number of degrees shown in Figure 1.

From a high of nearly 3,900 enrolled in 77 nuclear engineering degree programs in 1975, enrollment eventually fell by over two-thirds to approximately 1,215 enrolled in 38 nuclear engineering programs in 2000. Since then, total enrollment has recovered, remaining

FIGURE 3 | Nuclear Engineering Enrollment Trends, 1971-2015



Source: Oak Ridge Institute for Science and Education.

above 3,000 students enrolled annually in nuclear engineering academic programs since 2010. In 2015, over 3,450 students were enrolled in 35 nuclear engineering programs.

Figure 4 separates total enrollment into undergraduate (juniors and seniors) and graduate students. Both levels follow the same general trend, although at times the number of graduate students enrolled exceeded the number of juniors and seniors enrolled. Junior and senior enrollment of nuclear engineering students rose to approximately 2,160 in 1977 before falling to 460 juniors and seniors in 2000. Afterwards, junior and senior enrollment in nuclear engineering programs climbed to 2,185 students in 2012 before falling back to 1,760 students in 2015.

Graduate students enrolled in U.S. nuclear engineering programs were at an all-time high of 2,080 in 1975. The lowest number reported for graduate enrollment (750) occurred in 2001. Since then, graduate enrollment in nuclear engineering programs has climbed back to a 38-year high of nearly 1,700 in 2015.

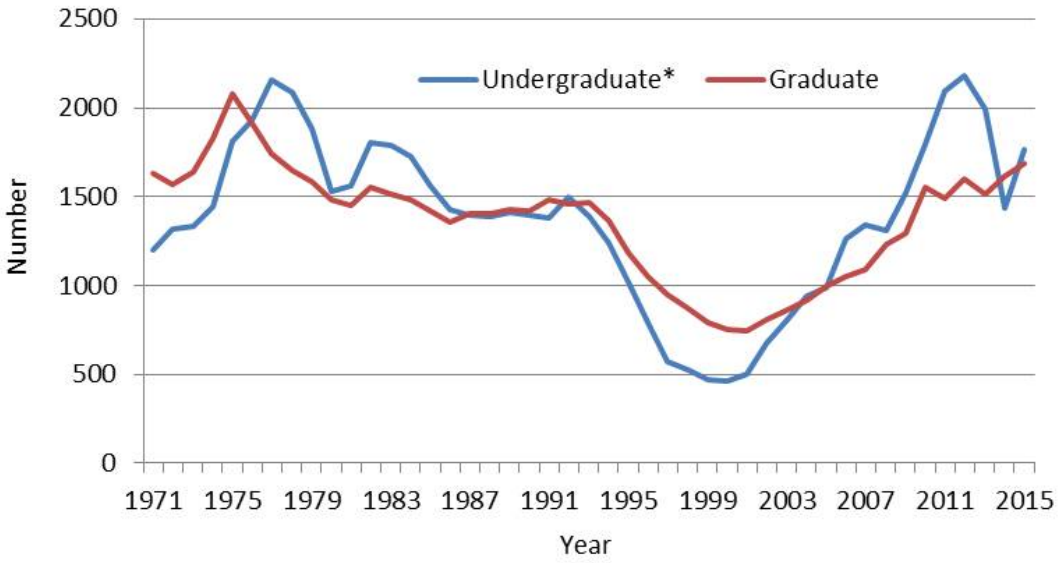
Women Receiving Nuclear Engineering Degrees

Information concerning the number of women receiving nuclear engineering degrees has not been collected on an annual basis since 1998, but data are available for selected years between 1999 through 2014. Figure 5 shows the percentage of women receiving nuclear engineering degrees increasing from near zero in the early 1970s and eventually rising to 1 out of every 5 degrees (20 percent) awarded in 2007. By 2014, however, the percentage of women receiving nuclear engineering degrees had fallen back somewhat to 15 percent of total degrees.

Postgraduation Plans

While not collected every year, surveys in most years asked nuclear engineering programs about the post-graduation plans of their graduates. Their responses in 1975 and 2015 are provided in Tables 1 and 2, respectively. Although the descriptions for post-graduation plans have changed over the years, some comparisons can still be made.

FIGURE 4 | Nuclear Engineering Enrollment Trends, by Academic Status, 1971-2015

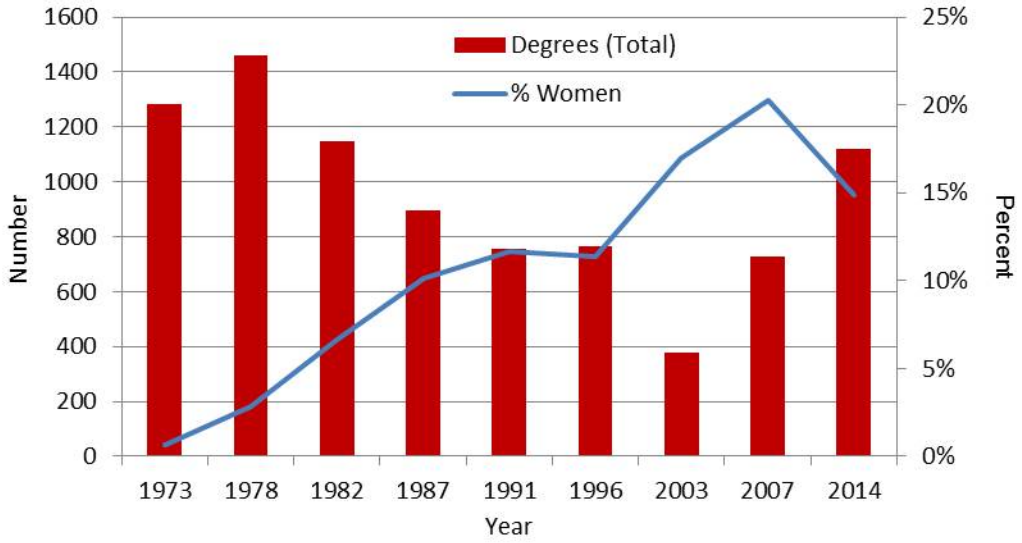


*Undergraduate = juniors and seniors only.

Note: Graduate enrollment was estimated for 2003. Undergraduate enrollment was estimated for 2003, 2004, and 2006.

Source: Oak Ridge Institute for Science and Education.

FIGURE 5 | Percentage of Nuclear Engineering Degrees Awarded to Women, Selected Years



Source: Oak Ridge Institute for Science and Education.

For example, the number of new bachelor's graduates with plans to work at government-owned, contractor-operated Installations in 1975 (before the U.S. Department of Energy (DOE) existed) corresponds closely to the number with plans to work for DOE contractors in 2015. One area with a marked contrast for 1975 graduates in comparison with 2015 graduates is the total number of new graduates reporting plans to work in industry in 1975 (366) versus the total number reporting plans to work for Industry (nuclear-utilities, other nuclear-related employment, and other business employment) in 2015 (189).

Conclusion

Fifty years of survey data provide evidence of nuclear engineering's resilience in the face of headwinds coming from changes in the U.S. nuclear power industry. After experiencing declines in both total enrollments and total degrees at the close of the 20th century, nuclear engineering degree production has enjoyed its own renaissance. While still not reaching the highs experienced in the late 1970s, the rebound in annual degrees awarded in nuclear engineering offers proof of the continuing interest of students in the field and the roles nuclear engineers play in today's economy as new graduates not only replace retiring nuclear engineers but are also engaged in fields such as nuclear medicine, diagnostic imaging, and cancer treatment. Operating extensions being granted to older nuclear power plants and construction of new nuclear power plants are expected to generate additional openings. Nevertheless, the Bureau of Labor Statistics projects total employment of nuclear engineers to fall by 4 percent over the 2014-2024 time period. Yet, the perception of nuclear energy as a carbon-free energy source will likely continue to encourage interest in nuclear engineering.

TABLE 1 | Employment or Other Post-Graduation Plans, 1975

	B.S.	M.S.	Ph.D.
Further Study	164	97	1
Academic	16	8	12
U.S. Government	18	18	9
Government-Owned, Contractor-Operated	20	32	11
State and Local Government	2	6	1
Industry	156	176	34
Military Service	23	48	8
Foreign	2	7	14
Other	1	1	2
Unknown	113	82	9
Total	**515**	**475**	**101**

Source: Oak Ridge Institute for Science and Education.

TABLE 2 | Employment or Other Post-Graduation Plans, 2015

	B.S.	M.S.	Ph.D.
Continued Study	121	115	17
Academic	2	3	11
Federal Government	10	11	24
DOE Contractor	21	18	17
State and Local Government	1	0	0
Nuclear Utility	34	24	0
Other Nuclear-Related	32	20	16
Other Business	42	10	11
Foreign (non-U.S.)	5	9	11
U.S. Military, Active Duty	44	28	5
Other	3	5	3
Still Seeking Employment	41	17	6
Unknown/Not Reported	296	103	26
Total	**652**	**363**	**147**

Source: Oak Ridge Institute for Science and Education.

References

Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook, 2016-17 Edition*, Nuclear Engineers, accessed October 2, 2016, retrieved from http://www.bls.gov/ooh/architecture-and-engineering/nuclear-engineers.htm.

Oak Ridge Institute for Science and Education, *Nuclear Engineering Enrollments and Degrees Survey*, data reports 1972-2015, Oak Ridge, TN, October 2016.

U.S. Energy Information Administration, *Annual Energy Outlook 2017* with Projections to 2050, January 2017, https://www.eia.gov/aeo, accessed February 6, 2017.

Endnotes

1. Beginning with the 2003 survey, the time period (or definition of academic year) for the enrollments and degrees surveys was changed from July - June to September - August.

2. There have been several updates to the enrollments and degrees data and the education programs surveyed over the 1966-2015 time period. As a result, some of the information reported may differ from its original publication.

3. Graduate enrollment was estimated for 2003, and undergraduate enrollment was estimated for the years 2003, 2004, and 2005.

This report is based on work performed under contract number DE-SC0014664 between the U.S. Department of Energy and Oak Ridge Associated Universities.

Additional survey data, providing details by individual schools and by type of program, is available from:

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