

# Health Physics Enrollments & Degrees Survey Data 50-Year Trend Assessment, 1966-2015

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## Introduction

The Health Physics 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 health physics or other course work equivalent to a major in health physics. According to the Health Physics Society, the health physicist's job is to manage the beneficial use of radiation by helping to minimize unnecessary radiation exposures (<https://hps.org/>, accessed Feb. 16, 2017). Some health physics programs are located in engineering departments. Health physics enrollments and degrees data may also be included in information regarding nuclear engineering enrollments and degrees.

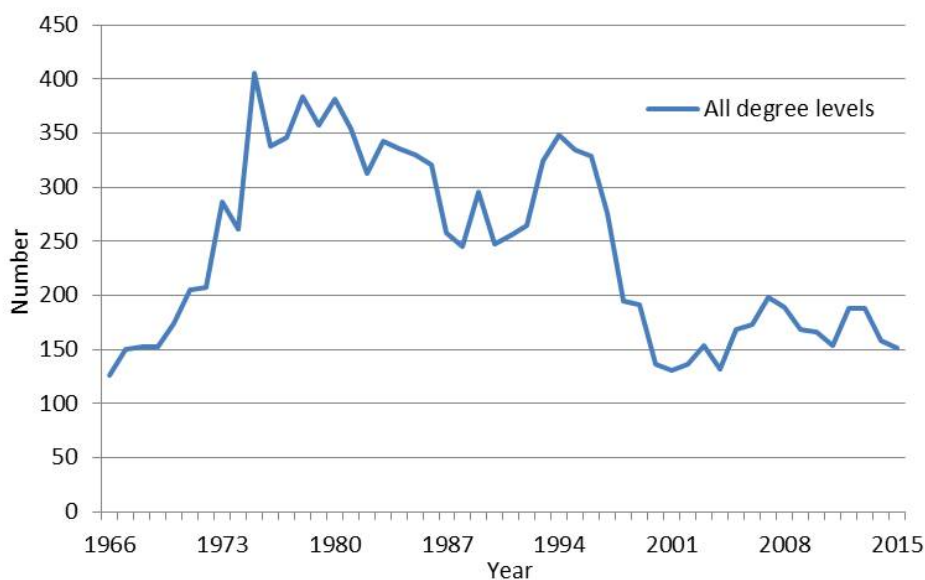
This historical perspective is timely because of the current interest about fields traditionally linked to nuclear-related employment as nuclear's share of electricity generation in the U.S. is projected by the Energy Information Administration to decline over the 2017-2040 time period. The impact of relatively inexpensive natural gas, an increasing ability to generate renewable energy, and decreasing demand for electricity from the modestly-growing U.S. economy have taken a toll on nuclear power

plant economics. Over the past several years, the U.S. nuclear energy renaissance appears to be winding down as long-time nuclear power plants such as Vermont Yankee and Kewaunee Power Station have shut down, and construction of new plants continues at lower levels than originally anticipated.

## Degrees

In [Figure 1](#), the total number of health physics degrees awarded annually is shown. In 1966, 29 academic programs reported over 125 total degrees in health physics compared to approximately 150 health physics degrees reported by 22 U.S. academic programs in 2015. If the beginning point of 1966 is compared to the end point of 2015, the total number of health physics degrees awarded in 2015 is 20 percent higher than in 1966. However, there is significant volatility in the number of health physics degrees awarded over the 50-year period. The total number of health physics degrees awarded reached a peak of over 400 in 1975 before falling back to around 130 in 2001, the second lowest reported number of health physics degrees awarded during this period. After 2001, the annual number of total health physics degrees awarded by the programs surveyed approached 200 in 2007 before falling again to a 12-year low in 2015 of around 150.

FIGURE 1 | Health Physics Degrees, 1966-2015



Source: Oak Ridge Institute for Science and Education.

These trends can be illustrated further through disaggregating by degree level. Figure 2 shows that the number of bachelor's degrees awarded annually in health physics peaked in 1978 at nearly 165, which is also the year that the number of awarded nuclear engineering bachelor's degrees peaked. Not coincidentally, 1978 was the last year an order was placed for a new commercial nuclear power plant for three decades. After falling to just over 30 health physics bachelor's degrees in 2000, the number rebounded to nearly 80 in 2007 before falling back to around 50 in 2015.

An interesting attribute of the health physics field is the dominance of the number of master's health physics degrees awarded in comparison to the number of bachelor's degrees awarded annually. With the three exceptions of 1978, 2005, and 2013, the number of master's health physics degrees has exceeded the number of bachelor's degrees, often by a substantial amount. Over the period 1966-1975, the number of bachelor's degrees awarded in health physics was also less than the number of Ph.D.s awarded annually. As Figure 2 illustrates, both master's degree awards and bachelor's degree awards experienced significant decreases in the latter half of the 1990s, with the number of bachelor's degrees awarded annually recovering first. Master's degrees peaked in the mid-1990s, reaching over 200 degrees awarded annually

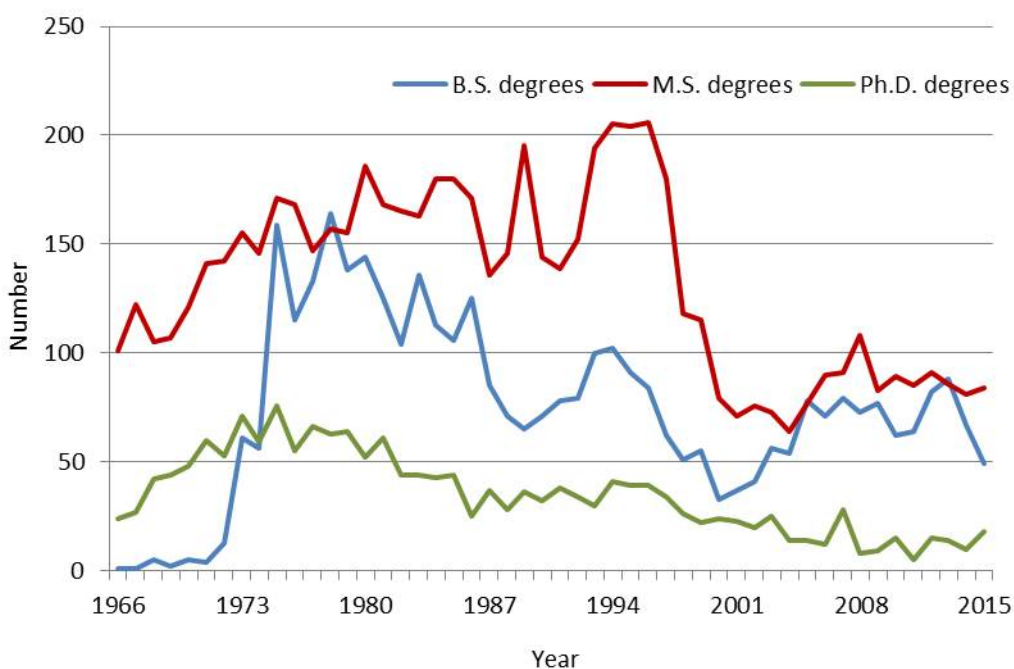
before falling to the lowest levels experienced over the 50-year period of 60 to 70 annually in the early 2000s. Since 2005, the number of master's degrees awarded annually has exceeded 80. Equally striking over the period 1966-2015, the number of Ph.D. degrees awarded annually declined steadily from 76 in 1975 to reach a low point of 5 in 2011 before more than tripling to 18 in 2015.

## Enrollment

Survey data on enrollment of undergraduate (juniors and seniors) and graduate students are available for the time period 1973-2015, although data are estimated for some years. In Figure 3, total enrollment of undergraduate (juniors and seniors) and graduate students exhibits a trend similar to the total number of degrees shown in Figure 1.

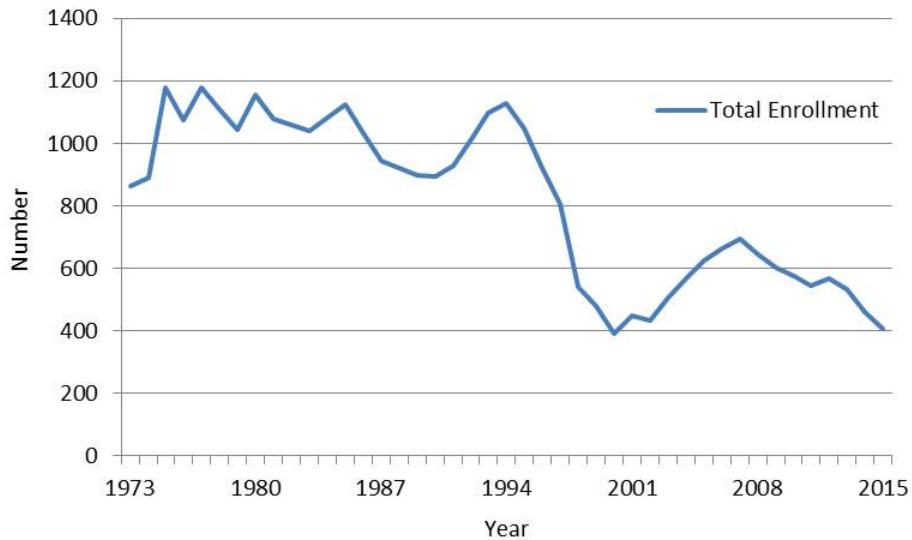
From a high of nearly 1,200 enrolled in 58 health physics degree programs in 1975, total enrollment remained relatively stable through the 1970s and the early 1980s before falling below 1,000 in 1987. In 1992, total enrollment once again rose above 1,000 and continued to increase to approximately 1,100 enrolled in 53 health physics programs in 1994. Afterwards, total enrollment fell to just under 400 in 2000 before recovering to nearly 700 in 2007. Since then, total enrollment has fallen, and in 2015 approximately 400 students were enrolled in the 22 health physics education programs surveyed.

**FIGURE 2 | Health Physics Degrees, by Degree Level, 1966-2015**



Source: Oak Ridge Institute for Science and Education.

**FIGURE 3 | Health Physics Enrollment Trends, 1973-2015**



Note: Enrollment was estimated for 1978, 1982, 1984, and 1988

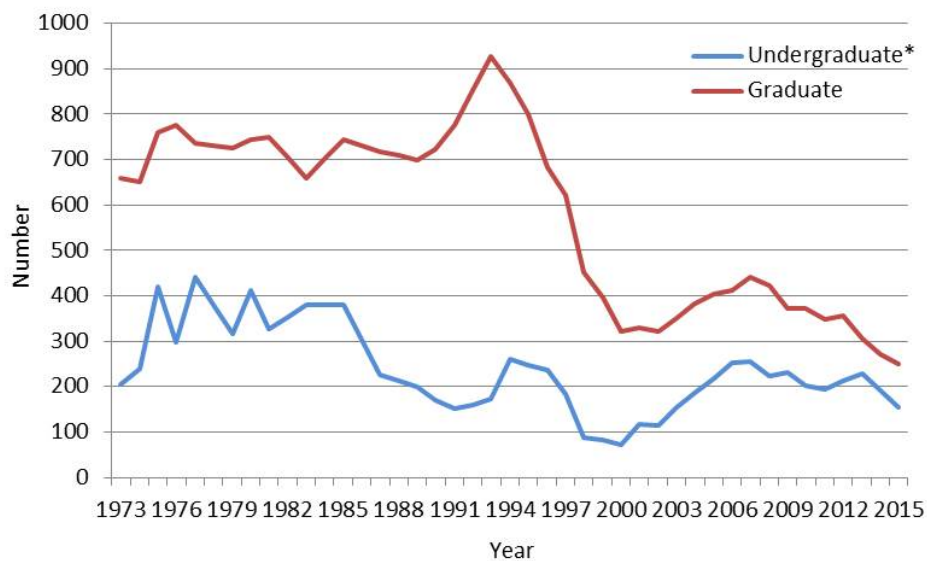
Source: Oak Ridge Institute for Science and Education.

Figure 4 separates total enrollment into undergraduate (juniors and seniors) and graduate students. Undergraduate enrollment is less than the enrollment of graduate students over the period 1973-2015, although the difference is narrowing. Graduate enrollment in the health physics programs surveyed hit an all-time high of approximately 925 in 1993. After 1993, graduate enrollment in health physics programs declined to around 330 by 2000-2002 before recovering to almost

450 in 2007. After 2007, however, graduate enrollment in the health physics programs surveyed declined further and hit an all-time low of about 250 in 2015.

Undergraduate enrollment of juniors and seniors in surveyed health physics programs rose to an all-time high of 440 in 1977 before falling to a low of about 70 juniors and seniors in 2000. Afterwards, junior and senior enrollment rose to about 250 students in 2007 before falling back to a little over 150 students in 2015.

**FIGURE 4 | Health Physics Enrollment Trends, by Academic Status, 1973-2015**

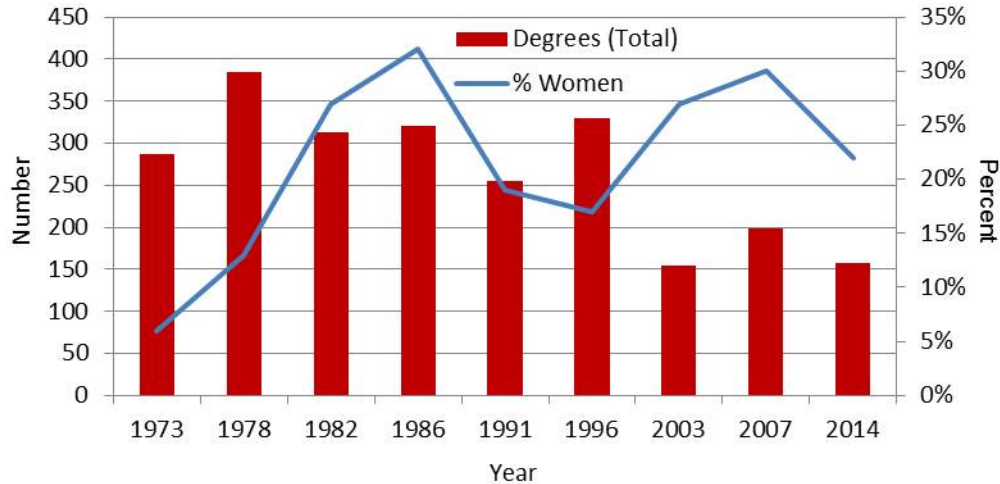


\*Undergraduate = juniors and seniors only.

Note: Enrollment was estimated for 1978, 1982, 1984, and 1988. In addition, undergraduate enrollment was estimated for 2006.

Source: Oak Ridge Institute for Science and Education.

**FIGURE 5 | Percentage of Health Physics Degrees Awarded to Women, Selected Years**



Source: Oak Ridge Institute for Science and Education.

## Women Receiving Health Physics Degrees

Information concerning the number of women receiving health physics degrees was collected on an annual basis from 1973 to 1996. Since 1996, data are only available for selected years between 2003 through 2014. As shown in Figure 5, the number of women receiving health physics degrees increased from 6 percent in 1973 to almost 32 percent of degrees awarded in 1986. After falling for several years, the percentage of total health physics degrees awarded to women had risen to 27 percent by 2003 and represented 30 percent of total health physics degrees awarded in 2007 before falling back to just over 20 percent in 2014. However, in absolute terms, 1986 remains the highest number of health physics degrees awarded to women by the health physics education programs surveyed.

## Postgraduation Plans

While not collected every year, surveys in most years asked health physics 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 category titles are somewhat different in Tables 1 and 2, some comparisons are still possible.

For example, the number of new graduates with plans to work for the U.S. government in 1975 (16) corresponds roughly to the number with plans to work for the federal government in 2015 (14). Another example of a sector with a similar share of new graduates in 1975 in comparison with 2015 is the percentage of new graduates reporting plans to work in industry in 1975 (16 percent) versus the percentage reporting plans to work for nuclear utilities, other nuclear-related employment, and other business employment in 2015 (17 percent). One area that is in marked contrast in 1975 when compared to 2015 concerns the reported plans of graduates to work at medical facilities, which shows a decline from 89 (22

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

	B.S.	M.S.	Ph.D.
Further Study	29	42	2
Academic	6	8	23
U.S. Government	4	9	3
Government-Owned, Contractor	4	12	13
State and Local Government	2	7	0
Medical Facilities	50	25	14
Industry	23	37	6
Military Service	1	1	0
Foreign	0	7	4
Others	2	0	1
Unknown	38	23	10
<b>Total</b>	<b>159</b>	<b>171</b>	<b>76</b>

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	12	14	2
Academic	2	6	2
Federal Government	0	12	2
DOE Contractor	2	1	0
State and Local Government	1	2	0
Medical Facilities	1	8	5
Nuclear Utility	4	4	1
Other Nuclear-Related	4	5	1
Other Business	0	6	1
Foreign (non-U.S.)	0	2	1
U.S. Military, Active Duty	1	0	0
Other	2	0	0
Still Seeking Employment	0	3	2
Unknown/Not Reported	20	21	1
<b>Total</b>	<b>49</b>	<b>84</b>	<b>18</b>

Source: Oak Ridge Institute for Science and Education.

percent) in 1975 to 14 (9 percent) in 2015. Another sector with a marked decrease is the number of graduates reporting plans to work at U.S. Department of Energy facilities in 2015 (3) in comparison to the number with employment plans at government-owned, contractor-operated facilities in 1975 (29).

## Conclusion

Fifty years of survey data provide evidence that health physics education programs continue to provide workers for the necessary job of managing the beneficial use of radiation by helping to minimize unnecessary radiation exposures. Over the years, as total nuclear-related employment has declined in traditional nuclear-related activities, health physicists continue to be in demand in many of the same sectors as before, although at a reduced magnitude. Job openings for new health physics graduates will likely occur due to the need to replace retiring health physicists and as operating extensions are granted to older nuclear power plants and new nuclear power plants are constructed. Also, employment in other sectors such as government, medical facilities, and educational institutions remain viable options for many new graduates.

## References

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

Oak Ridge Institute for Science and Education, *Nuclear-Related Employment Declines in 1995*, prepared for Office of Energy Research, U.S. Department of Energy, Manpower Assessment Brief Number 37, May 1996.

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 survey was changed from July – June to September – August.
2. There have been several revisions to the enrollment and degree 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.

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All opinions expressed in this report are the author's and do not necessarily reflect policies and views of the U.S. Department of Energy, the Nuclear Regulatory Commission, or the Oak Ridge Institute for Science and Education.

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

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