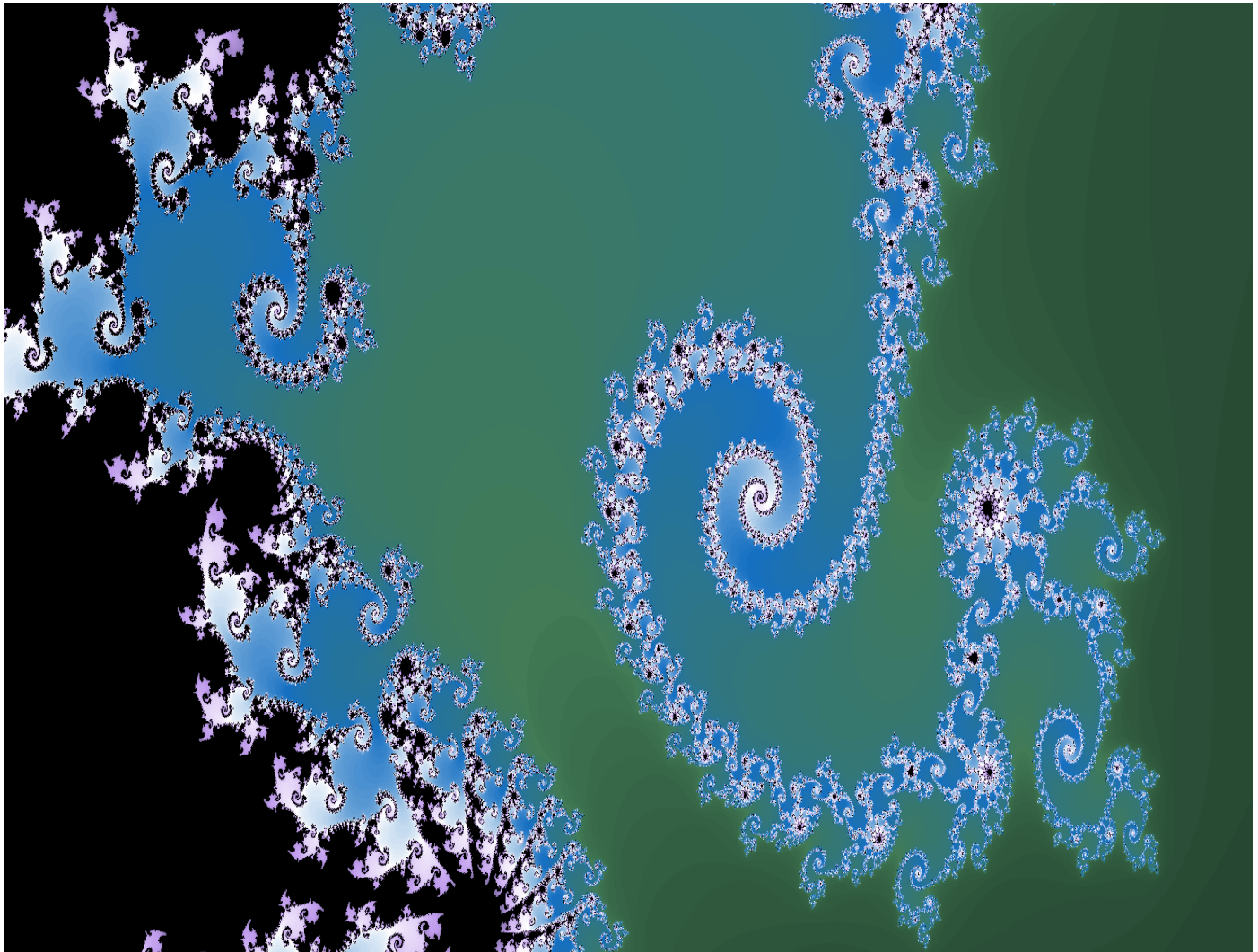# Enrollment Snapshot of Radiography, Radiation Therapy, and Nuclear Medicine Technology Programs – 2019

December 2019

asrt

American Society of Radiologic Technologists

Table of Contents

Executive Summary

In early October 2019, an invitation to complete an online questionnaire was sent via email to 956 radiography, radiation therapy, and nuclear medicine technology programs listed by the American Registry of Radiologic Technologists (ARRT). At the close of the survey in mid-November 2019, a total of 335 responses had been received, yielding an overall response rate of 35.0%.

	Return	Population	Percent Sampled	Margin of Error at the 95% Level
Radiography	265	734	36.1%	±4.8%
Radiation Therapy	31	106	29.2%	±14.9%
Nuclear Medicine	26	116	22.4%	±17.0%
Overall	**335**	**956**	**35.0%**	**±4.3%**

This report summarizes findings regarding radiologic sciences enrollment in ARRT-recognized programs based on the responses from program directors.

Demographic Analysis

Most programs that responded to the survey are in radiography (79.1%); of the remaining respondents, 9.3% were radiation therapy, 7.8% were nuclear medicine, and 3.9% were other types of imaging programs.

A plurality of respondents (38.5%) work at a community college; 28.1% work at a university, 15.2% at a medical center, 10.4% at a technical college, and 5.1% at a for-profit school. The remaining 2.7% work at another type of institution.

The most common terminal degree offered by responding institutions remains an associate degree (63.3%); 21.2% offer a bachelor's degree, and 15.5% offer another type of degree.

The vast majority of programs surveyed (97.3%) are located in the United States; 1.8% are in Canada, 0.3% are in Australia, and 0.6% are elsewhere.

The US regions with the highest response rates were South Atlantic and East North Central, representing 22.1% and 17.8% of all responses, respectively. The lowest response rates were in the Pacific region and New England at 6.4% and 4.3%, respectively.

Enrollment Analysis

Based on the survey response, radiography programs enrolled an average of 21.8 students in 2019. This represents a decline of 0.6 students per program from 2018. This produces an overall estimate of 15,972 students entering ARRT-certified radiography programs in 2019, down from 16,374 in 2018.

On average, radiation therapy programs enrolled 10.9 students in 2019. This represents a decrease of 1.5 students per program from 2018 when, on average, 12.4 students enrolled in each radiation therapy program. This produces an overall estimate of 1,155 students enrolling in ARRT-certified radiation therapy programs in 2019, down from 1,356 in 2018.

On average, nuclear medicine programs enrolled 9.7 students in 2019. This represents a decline of 1.3 students per program from 2018 when, on average, 11.0 students enrolled in each nuclear medicine program. Overall, this produces an estimate of 1,129 students enrolling in nuclear medicine programs in 2019, down from 1,287 in 2018.

2019 Student Capacity

Asked whether their program is currently at full enrollment, 57.0% of radiography programs, 41.9% of radiation therapy programs, and 46.2% of nuclear medicine programs said that they are at capacity.

There were no statistically significant differences between disciplines.

Programs not at full enrollment were asked how many additional students their program could accommodate. On average, radiography programs said they could accommodate an additional 6.1 students, radiation therapy programs said they could accommodate an additional 4.1 students, and nuclear medicine programs said they could accommodate an additional 4.4 students.

For programs not at capacity, this produces an estimate of 1,922 additional spaces for students across all radiography programs, 250 additional spaces students across all radiation therapy programs, and 276 additional spaces students in nuclear medicine.

The mean number of qualified students turned away by radiography programs was 23.2. Radiation therapy programs turned away an average of 16.4 qualified students, and nuclear medicine programs turned away an average of 2.1 qualified students.

This produces an estimate of 9,694 qualified students turned away in radiography, 726 turned away by therapy programs, and 114 turned away by nuclear medicine programs.

Near-term Changes

Most of the programs surveyed plan to maintain their current levels of enrollment; 76.1% of programs across these disciplines plan to keep their enrollment at the same level; 21.2% of programs plan to increase enrollment, and the remaining 2.7% plan to decrease their enrollment.

In radiography, 76.6% of programs plan to maintain current enrollment; 21.5% plan to increase their enrollment, and the remaining 1.9% of programs plan to decrease their enrollment.

In radiation therapy, 77.4% of programs plan to keep their current enrollment; 12.9% are planning an increase, and 9.7% plan to decrease enrollment.

In nuclear medicine, 80.8% of programs plan to leave their enrollment unchanged, 19.2% are planning an increase, and none plan to decrease their enrollment.

There were no significant differences between groups.

The majority of programs across disciplines (83.6%) will definitely continue to operate; 15.8% will most likely continue operations, and the remaining 0.6% will most likely close. There were no programs with definite plans to close.

In radiography, 86.8% of programs said they would definitely continue to operate; 12.8% will most likely continue operation, and the remaining 0.4% will likely close.

In radiation therapy, 77.4% of programs will definitely continue to operate and 22.6% will most likely continue operations.

In nuclear medicine, 50.0% of programs will definitely continue to operate, 46.2% will likely continue to operate, and the remaining 3.8% will likely close.

There were significant differences between groups.

Program Outcomes

Asked about the attrition rate[1] of their program, respondents indicated that, on average:

- 16.5% of students in radiography programs failed to complete their course of study.
- 7.0% of students in radiation therapy programs failed to complete their course of study.
- 15.0% of students in nuclear medicine programs failed to finish their studies.

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[1] Methodological Note: In previous years, no attempt was made to determine the plausibility of responses about attrition. The last two years responses were recoded according to the following scheme: If the respondent indicated an attrition rate of 59% or lower, the response was left as is. If the respondent indicated an

attrition rate over 59%, the response was recoded as $(1-x)$ where x = *uncoded user response*. For this reason, reported attrition means on the last two Enrollment Snapshots will be noticeably lower than they have been in previous years.

Glossary

The following statistical results are displayed using a common set of acronyms and symbols for brevity. The symbols and acronyms used are listed here for reference.

N
Number of responses.

Valid Percent
Percentage of total responses.

Mean
The arithmetic average.

Population
The total number of programs.

SD
Standard deviation.

X^2
Chi-squared, from Pearson's Chi-Squared to test for statistical significance.

F
F-statistic, from analysis of variance (ANOVA) to test for statistical significance.

P
Probability, as a measure for statistical significance when $P \leq 0.05$.

Demographics

Indicate your program type.

	N	Valid Percent	Population Distribution	Sample Return as Percent of Population
Radiography	265	79.1%	734	36.1%
Radiation Therapy	31	9.3%	106	29.2%
Nuclear Medicine Technology	26	7.8%	116	22.4%
Other	13	3.9%	n/a	n/a
Total	**335**	100.0%	**956**	**35.0%**

Indicate your program type.
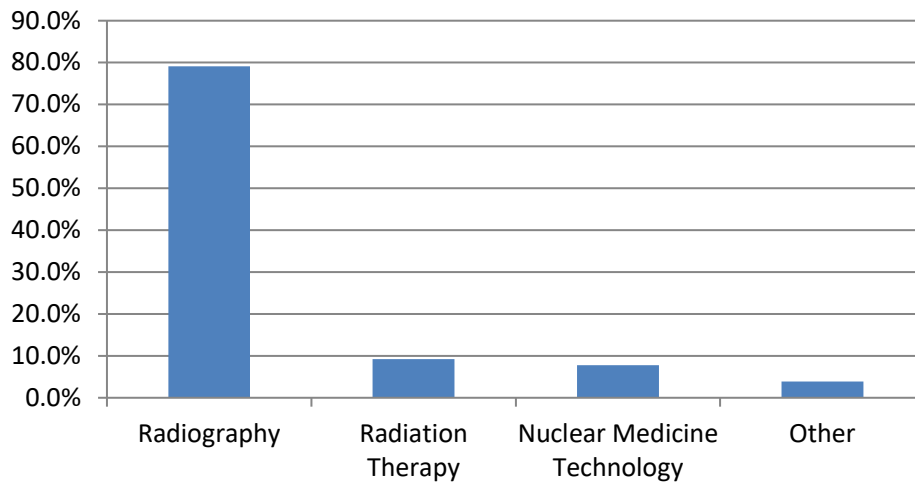
What is your primary place of employment?

	N	Valid Percent
Community college or two-year institution	129	38.5%
University or four-year institution	94	28.1%
Medical center	51	15.2%
Technical college	35	10.4%
For-profit school	17	5.1%
Other	9	2.7%
Total	**335**	100.0%

What is your primary place of employment?
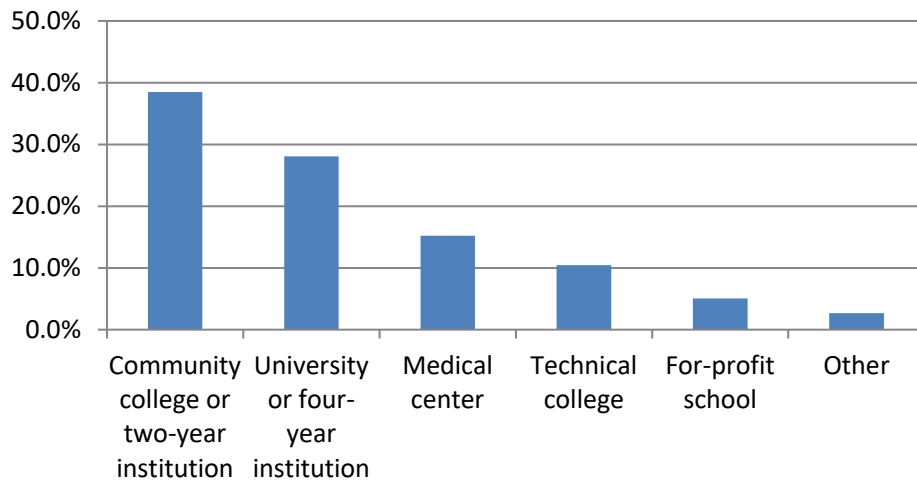
What is the terminal degree earned by the graduates in your program?

	N	Valid Percent
Associate degree	212	63.3%
Bachelor's degree	71	21.2%
Other	52	15.5%
Total	**335**	100.0%

What is the terminal degree earned by the graduates in your program?
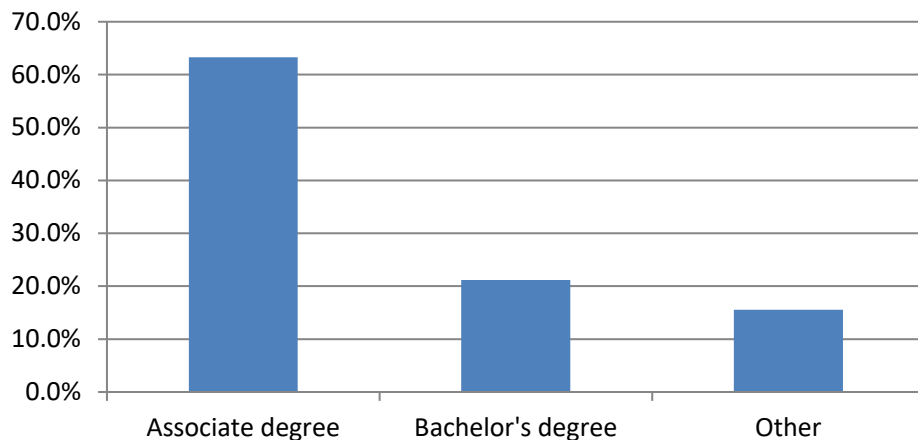
In what country is your program located?

	N	Valid Percent
United States	326	97.3%
Canada	6	1.8%
Australia	1	0.3%
Other	2	0.6%
Total	**335**	100.0%

In what country is your program located?
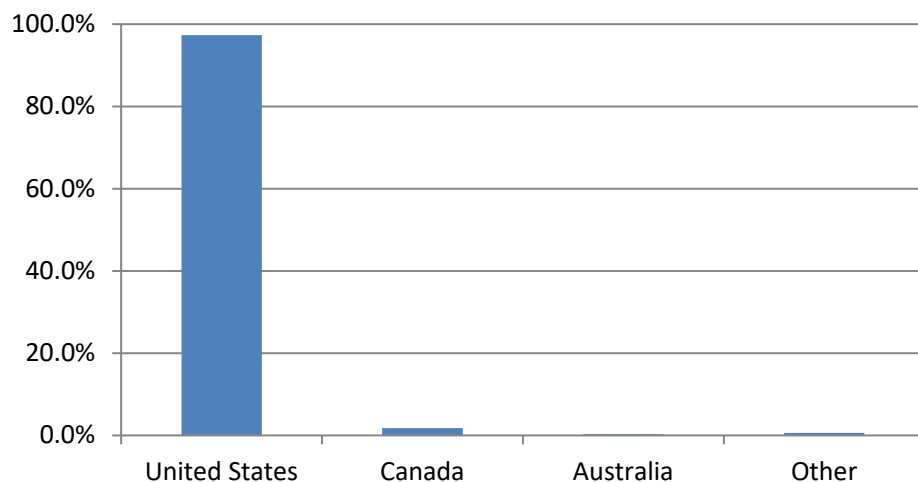
If you chose the United States in the question above, please indicate in which region your program is located.

	N	Valid Percent
South Atlantic (DE, MD, DC, VA, WV, NC, SC, GA, FL, PR)	72	22.1%
East North Central (WI, MI, IL, IN, OH)	58	17.8%
Mid-Atlantic (NY, PA, NJ)	48	14.7%
West South Central (OK, TX, AR, LA)	37	11.3%
West North Central (ND, SD, NE, KS, MN, IA, MO)	29	8.9%
East South Central (KY, TN, MS, AL)	24	7.4%
Mountain (ID, MT, WY, NV, UT, CO, AZ, NM)	23	7.1%
Pacific (AK, WA, OR, CA, HI)	21	6.4%
New England (ME, NH, VT, MA, RI, CT)	14	4.3%
Total	**326**	100.0%

If you chose the United States in the question above, please indicate in which region your program is located.

2019 Enrollment Analysis

Mean number of students entering by program and institution type.

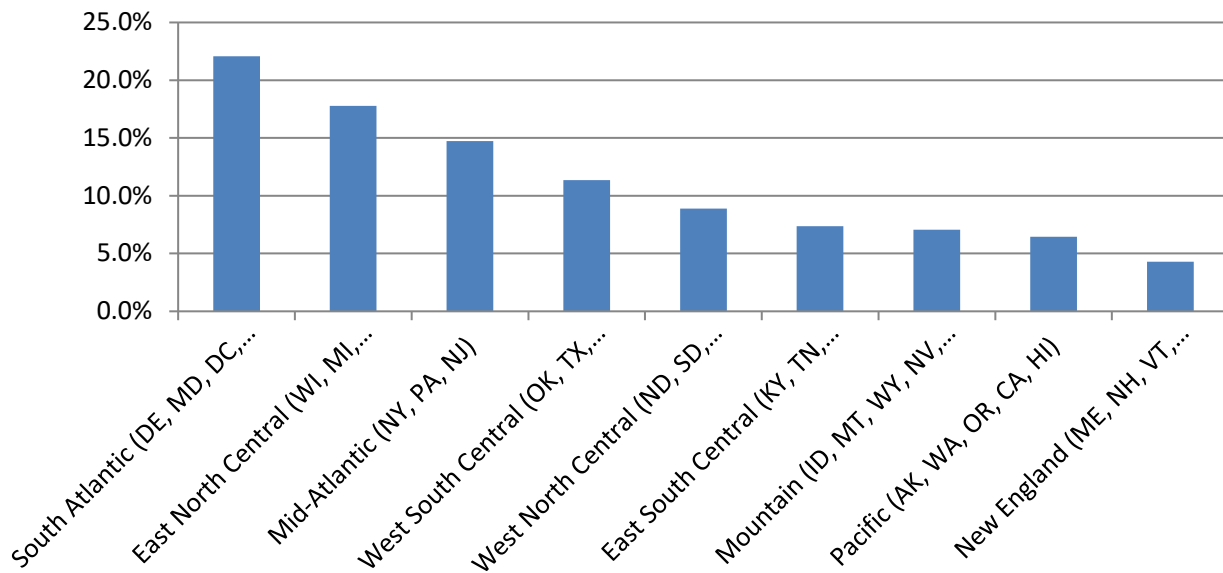|	Radiography			Radiation Therapy			Nuclear Medicine Technology			Total		
	Mean	N	*SD*	**Mean**	N	*SD*	**Mean**	N	*SD*	**Mean**	N	*SD*
For-profit school	**27.9**	14.0	16.4	19.0	1.0	.	**3.0**	1.0	.	**25.2**	17.0	16.3
Community college or two-year institution	**23.9**	117.0	11.7	12.8	4.0	3.3	**12.4**	5.0	7.8	**22.9**	129.0	11.7
Technical College	**22.7**	30.0	19.3	24.0	1.0	.	**10.0**	2.0	.0	**22.3**	35.0	18.2
University or four-year institution	**23.4**	55.0	18.2	10.2	19.0	3.9	**9.5**	15.0	6.0	**19.0**	94.0	18.9
Medical center	**12.5**	43.0	6.8	7.0	3.0	2.6	**8.7**	3.0	5.7	**11.6**	51.0	6.8
Other:	**13.7**	6.0	5.8	10.0	3.0	5.3	**.**	.	.	**12.4**	9.0	5.6
Total	**21.8**	**265.0**	**14.5**	**10.9**	**31.0**	**4.8**	**9.7**	**26.0**	**6.0**	**19.8**	**335.0**	**14.9**

An analysis of variance showed an overall difference in the mean number of students entering by institution type, $F_{(5, 334)} = 5.677$, $P < .001$. Post hoc comparisons using the Bonferroni correction indicated that the mean number of students entering medical centers and "Other" were statistically different than the other institution types, $P < .001$, (.05/6).

Mean number of students entering by institution type. (Overall)
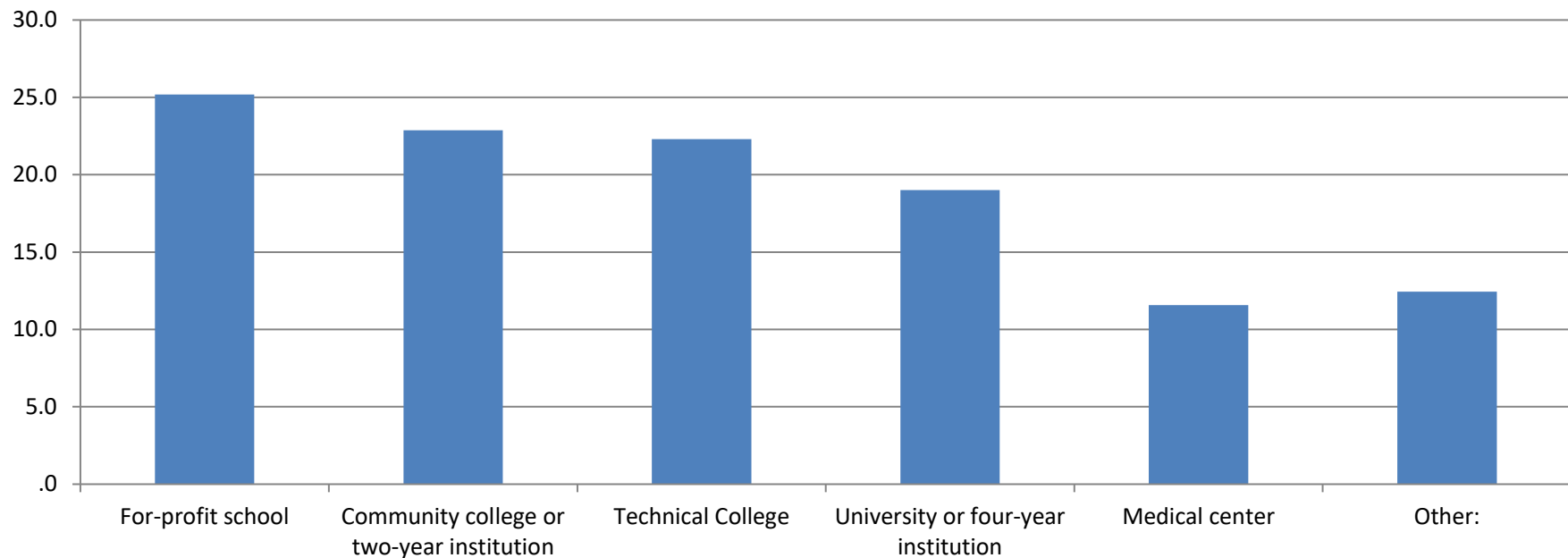
Is your program currently at full enrollment?

		Radiography	Radiation Therapy	Nuclear Medicine Technology	Total
Yes	N	151	13	12	184
	%	57.0%	41.9%	46.2%	54.9%
No	N	114	18	14	151
	%	43.0%	58.1%	53.8%	45.1%
Total	N	265	31	26	335
	%	100.0%	100.0%	100.0%	100.0%

There were no statistically significant differences between disciplines.

Is your program currently at full enrollment?

	Radiography			Radiation Therapy			Nuclear Medicine Technology			Total		
	Mean	N	*SD*	Mean	N	*SD*	**Mean**	N	*SD*	**Mean**	N	*SD*
If you are not at full enrollment, how many additional students could be accommodated by your program?	**6.1**	111	7.7	4.1	18	2.9	**4.4**	14	**4.9**	**5.8**	147	7.0
How many qualified students did you turn away this fall?	**23.2**	257	34.5	16.4	31	41.9	**2.1**	26	**3.4**	**21.0**	326	35.0
Attrition rate in 2018	**16.5%**	250	13.5%	7.0%	30	13.0%	**15.0%**	25	**15.3%**	15.2%	318	13.8%

If you are not at full enrollment, how many additional students could be accommodated by your program?
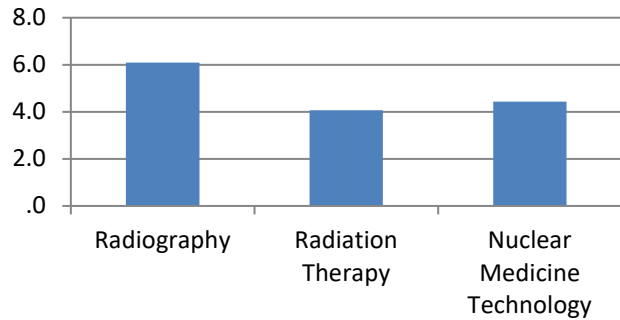
How many qualified students did you turn away this fall?
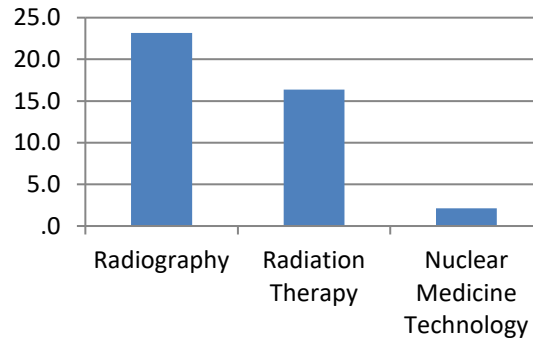
What was the attrition rate for the class of 2018?
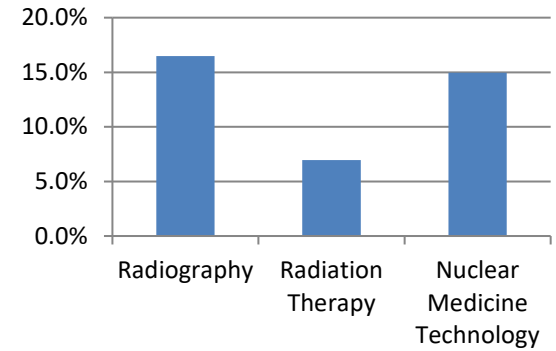
Do you plan any changes related to enrollment?

		Radiography	Radiation Therapy	Nuclear Medicine Technology	Total
Plan to remain the same	N	203	24	21	255
	%	76.6%	77.4%	80.8%	76.1%
Plan to increase	N	57	4	5	71
	%	21.5%	12.9%	19.2%	21.2%
Plan to decrease	N	5	3	0	9
	%	1.9%	9.7%	0.0%	2.7%
Total	N	265	31	26	335
	%	100.0%	100.0%	100.0%	100.0%

There were no statistically significant differences between disciplines.

Do you plan any changes related to enrollment?
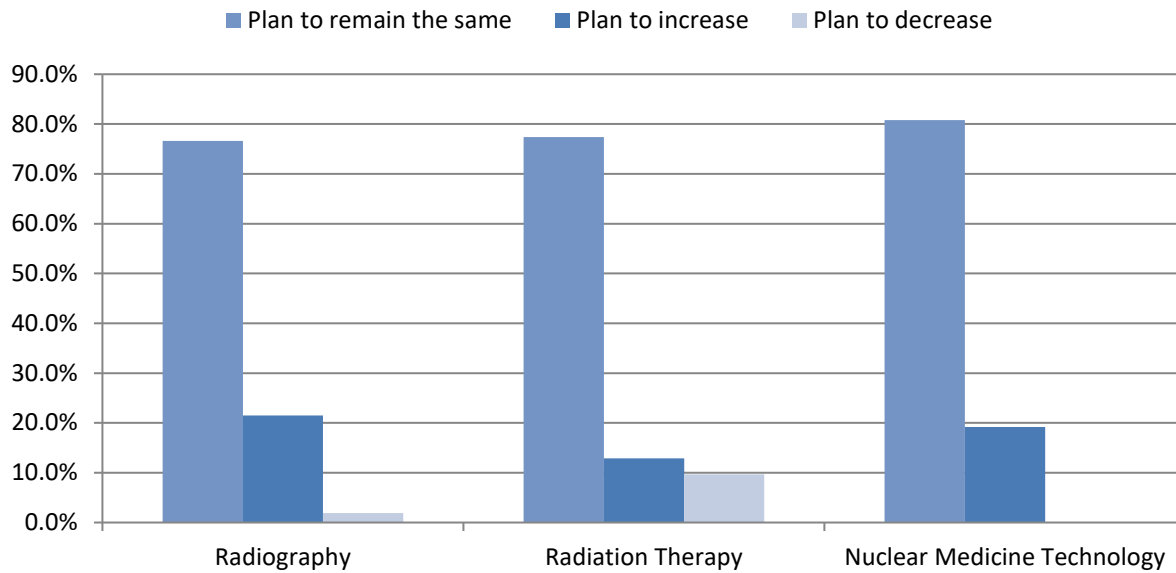
How viable is your program over the next few years?

		Radiography	Radiation Therapy	Nuclear Medicine Technology	Total
Will definitely continue to operate	N	230	24	13	280
	%	86.8%	77.4%	50.0%	83.6%
Most likely will continue to operate	N	34	7	12	53
	%	12.8%	22.6%	46.2%	15.8%
Most likely will be closing	N	1	0	1	2
	%	0.4%	0.0%	3.8%	0.6%
Definitely will be closing	N	0	0	0	0
	%	0.0%	0.0%	0.0%	0.0%
Total	N	265	31	26	335
	%	100.0%	100.0%	100.0%	100.0%

The proportional difference in the response distribution of nuclear medicine technology compared to the other two disciplines was statistically significant, χ^2 (6, n = 335) = 29.0 p < .001.

How viable is your program over the next few years?
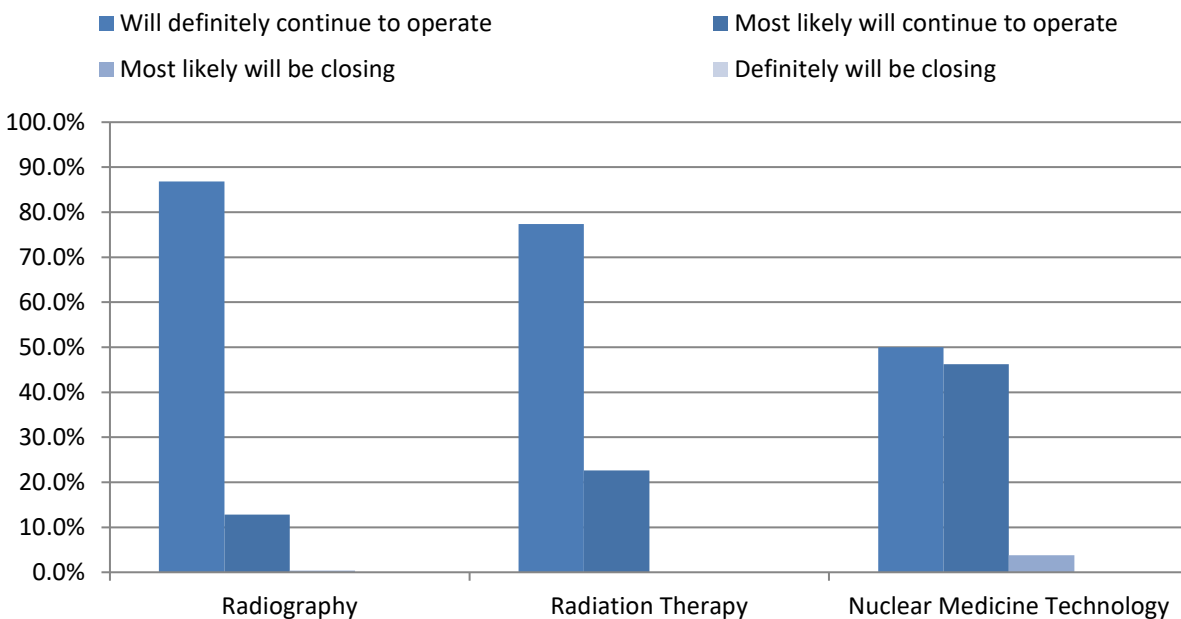
Longitudinal Enrollment Trends

Radiography

Year	ARRT recognized programs	Percent of programs responding to survey with enrollment data	Mean number of students entering classroom	Estimated total number of students entering for all programs	Mean attrition Rate	Percent of programs not at full capacity	Mean additional students per program for those not at full capacity	Estimated total additional students for programs not at full capacity	Mean qualified students per program turned away	Estimated total qualified students turned away
2001	590	75.4%	21.2	12,508	21.6%	50.2%	.	.	.	.
2002	631	67.5%	23.4	14,734	23.6%	30.9%	8.7	1,696	31.6	13,778
2003	639	71.4%	23.4	14,965	21.6%	21.2%	5.8	786	46.8	23,565
2004	684	68.7%	22.9	15,684	20.5%	21.7%	7.5	1,113	55.1	29,510
2005	715	66.4%	22.8	16,333	18.1%	20.9%	7.4	1,106	50.9	28,787
2006	723	74.7%	24.0	17,323	18.4%	22.6%	7.0	1,144	59.2	33,128
2007	729	69.3%	22.8	16,614	17.8%	30.2%	7.1	1,563	56.8	28,902
2008	742	71.0%	23.0	17,066	21.1%	33.3%	8.4	2,076	50.4	24,944
2009	746	61.0%	22.5	16,785	20.8%	40.0%	3.7	1,104	43.4	19,426
2010	751	65.5%	21.2	15,948	23.3%	43.7%	7.6	2,490	39.1	16,528
2011	751	57.8%	21.9	16,454	25.8%	46.2%	7.6	2,637	37.1	14,978
2012	750	62.8%	20.9	15,645	29.1%	44.9%	8.3	2,785	39.5	16,336
2013	741	50.5%	21.8	16,154	27.9%	46.5%	7.8	2,688	36.3	14,391
2014	739	49.1%	20.6	15,211	31.2%	50.3%	7.2	2,682	34.1	12,522
2015	736	54.2%	20.7	15,228	36.7%	49.9%	8.7	3,195	27.7	10,214
2016	736	39.5%	21.1	15,537	18.2%	47.6%	6.6	2,326	23.6	9,102
2017	727	35.6%	21.7	15,769	18.5%	47.5%	8.3	2,849	30.8	11,756
2018	730	40.8%	22.4	16,374	15.0%	43.3%	7.1	2,235	26.6	11,002
2019	**734**	**36.1%**	**21.8**	**15,972**	**16.5%**	**43.0%**	**6.1**	**1,922**	**23.2**	**9,694**

Estimated total number of students entering Radiography programs:

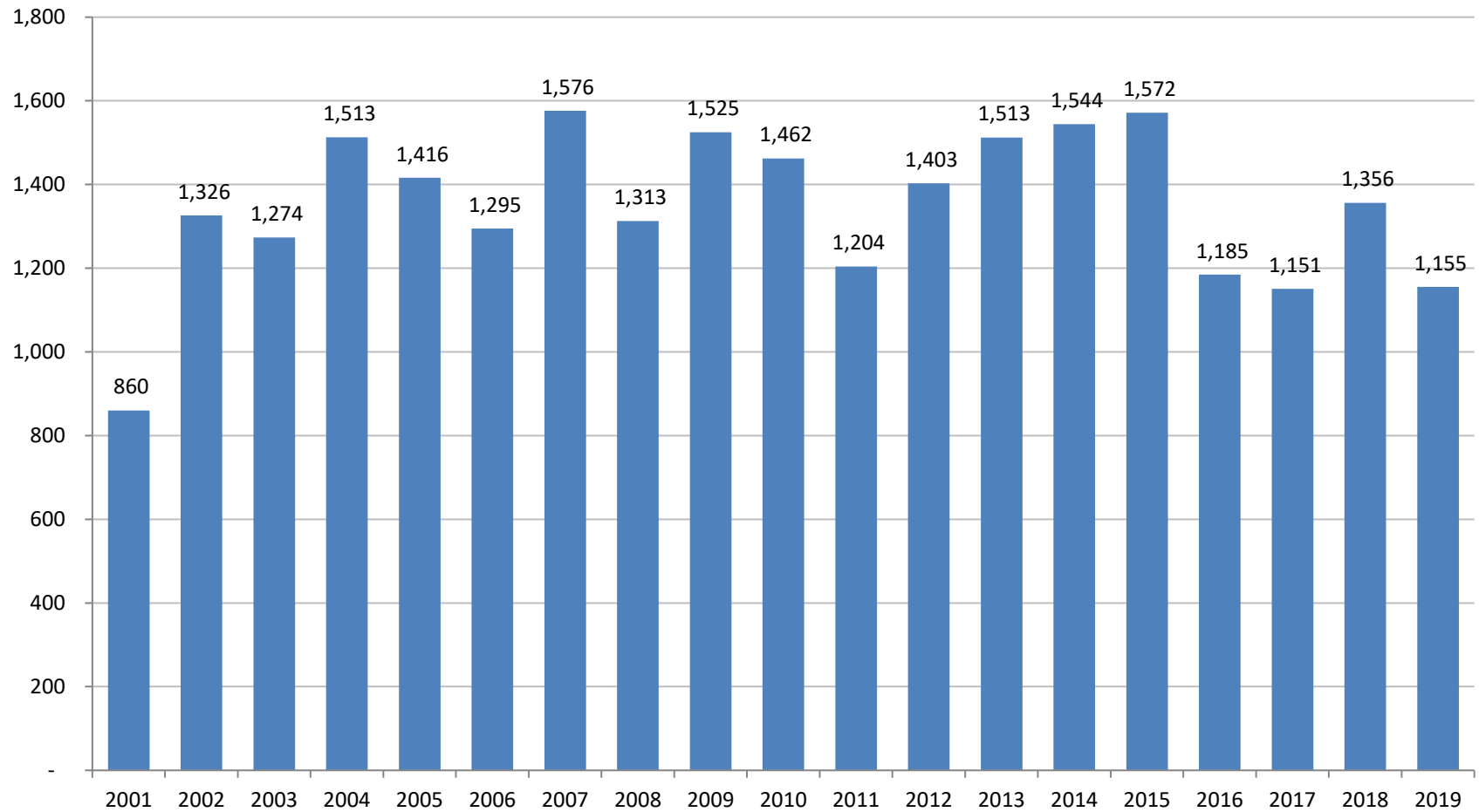| Year	Students
2001	12,508
2002	14,734
2003	14,965
2004	15,684
2005	16,333
2006	17,323
2007	16,614
2008	17,066
2009	16,785
2010	15,948
2011	16,454
2012	15,645
2013	16,154
2014	15,211
2015	15,228
2016	15,537
2017	15,769
2018	16,374
2019	15,972
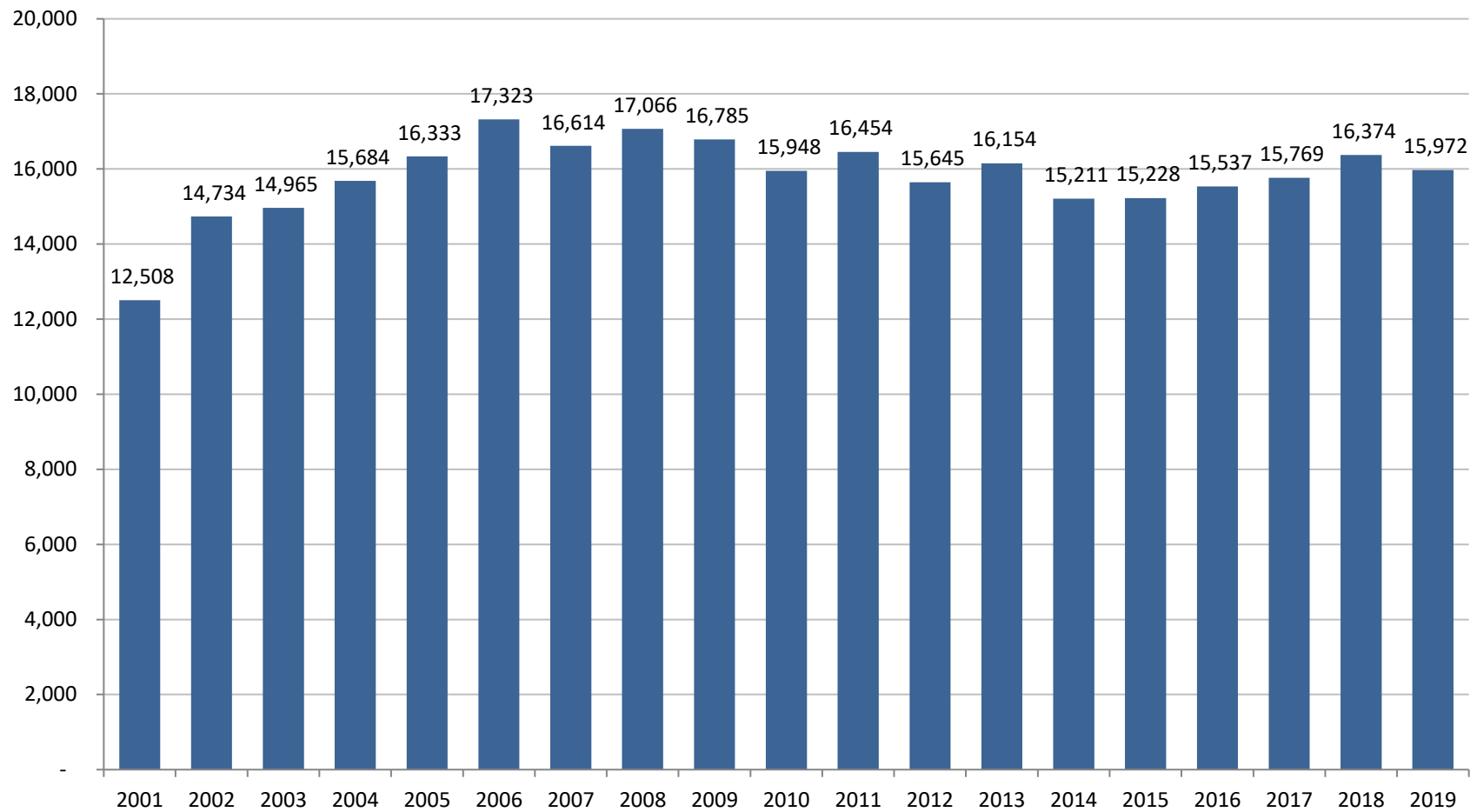
Radiation Therapy

Year	ARRT recognized programs	Percent of programs responding to survey with enrollment data	Mean number of students entering classroom	Estimated total number of students entering for all programs	Mean attrition Rate	Percent of programs not at full capacity	Mean additional students per program for those not at full capacity	Estimated total additional students for programs not at full capacity	Mean qualified students per program turned away	Estimated total qualified students turned away
2001	86	60.5%	10.0	860	18.1%	44.4%	.	.	.	.
2002	95	58.9%	14.0	1,326	11.1%	48.0%	5.7	260	9.1	450
2003	101	57.4%	12.6	1,274	18.0%	44.6%	4.4	198	13.6	761
2004	105	55.2%	14.4	1,513	11.9%	30.5%	12.5	400	13.4	978
2005	113	63.7%	12.5	1,416	16.8%	32.1%	3.4	123	24.5	1880
2006	118	68.6%	11.0	1,295	16.6%	49.3%	6.4	372	21.6	1292
2007	122	57.4%	12.9	1,576	15.2%	51.5%	6.3	396	13.3	787
2008	125	49.6%	10.5	1,313	14.4%	58.6%	4.5	330	33.0	1708
2009	122	50.8%	12.5	1,525	10.9%	55.5%	3.7	251	15.8	858
2010	122	58.2%	12.0	1,462	18.3%	49.3%	7.9	475	18.0	1112
2011	123	42.3%	9.8	1,204	21.9%	51.9%	6.1	388	14.3	846
2012	122	48.4%	11.5	1,403	18.9%	53.4%	6.9	451	14.4	818
2013	121	55.4%	12.5	1,513	21.8%	57.6%	5.7	397	17.1	877
2014	117	45.3%	13.2	1,544	26.5%	49.1%	6.2	355	15.7	935
2015	113	49.6%	13.9	1,572	24.6%	55.4%	7.1	444	14.8	746
2016	110	35.5%	10.8	1,185	7.3%	60.5%	4.6	309	11.3	492
2017	110	33.6%	10.5	1,151	10.0%	43.2%	5.2	247	16.0	998
2018	109	37.6%	12.4	1,356	9.4%	43.9%	7.7	369	29.0	1773
2019	106	29.2%	10.9	1,155	7.0%	58.1%	4.1	250	16.4	726

Estimated total number of students entering Radiation Therapy programs:

Year	Value
2001	860
2002	1,326
2003	1,274
2004	1,513
2005	1,416
2006	1,295
2007	1,576
2008	1,313
2009	1,525
2010	1,462
2011	1,204
2012	1,403
2013	1,513
2014	1,544
2015	1,572
2016	1,185
2017	1,151
2018	1,356
2019	1,155

Nuclear Medicine

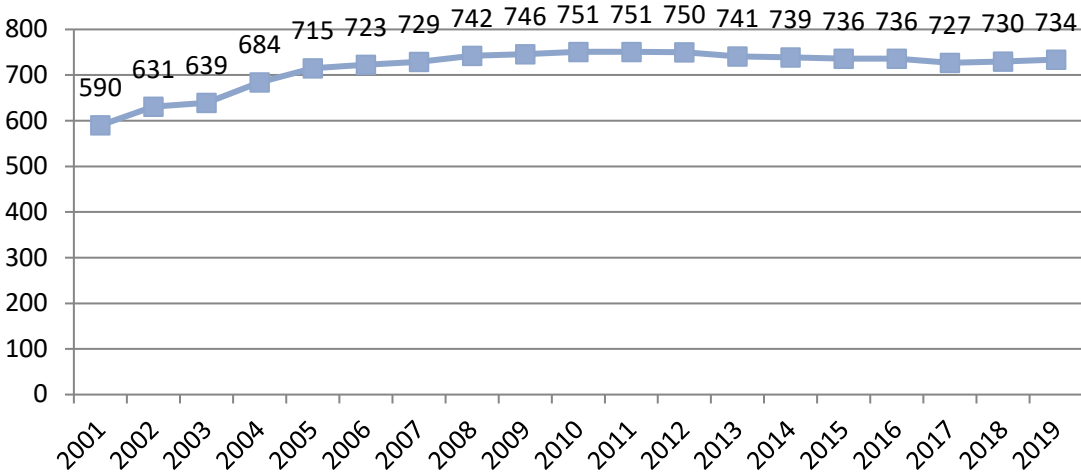| Year	ARRT recognized programs	Percent of programs responding to survey with enrollment data	Mean number of students entering classroom	Estimated total students enrolled for all programs	Mean attrition Rate	Percent of programs not at full capacity	Mean additional students per program for those not at full capacity	Estimated total additional students for programs not at full capacity	Mean qualified students per program turned away	Estimated total qualified students turned away
2001	101	62.4%	12.4	1,252	11.8%	53.2%	.	.	.	.
2002	104	55.8%	14.0	1,454	8.0%	35.7%	6.7	249	19.7	1317
2003	111	59.5%	14.5	1,612	7.1%	33.3%	2.7	100	32.1	2377
2004	117	58.1%	14.0	1,633	9.8%	20.9%	3.6	88	24.4	2258
2005	122	57.4%	13.7	1,673	8.6%	30.6%	5.1	190	32.9	2786
2006	131	71.8%	15.5	2,033	10.2%	31.8%	5.7	237	30.2	2698
2007	132	56.8%	13.5	1,781	8.3%	39.7%	6.3	330	24.2	1926
2008	136	59.6%	12.2	1,659	12.3%	58.4%	10.0	794	18.2	1030
2009	136	48.5%	10.8	1,469	7.0%	63.0%	4.3	368	9.3	468
2010	136	48.5%	11.3	1,534	12.9%	78.8%	7.0	748	12.9	372
2011	134	47.0%	8.8	1,175	11.3%	82.5%	7.2	796	8.0	187
2012	134	56.7%	10.5	1,407	18.4%	73.0%	8.7	851	6.4	231
2013	128	46.9%	10.0	1,280	23.8%	76.1%	7.9	770	7.8	239
2014	125	42.4%	8.5	1,061	36.7%	79.2%	8.1	802	8.3	216
2015	122	50.8%	10.5	1,276	17.3%	68.9%	6.0	504	4.5	171
2016	120	33.3%	11.4	1,368	11.1%	67.5%	7.8	632	3.2	124
2017	117	27.4%	10.9	1,273	9.3%	71.9%	6.7	559	2.5	82
2018	117	23.1%	11.0	1,287	8.1%	59.3%	11.0	761	8.8	418
2019	116	22.4%	9.7	1,129	15.0%	53.8%	4.4	276	2.1	114

Estimated total number of students entering Nuclear Medicine Technology programs:

Year	Students
2001	1,252
2002	1,454
2003	1,612
2004	1,633
2005	1,673
2006	2,033
2007	1,781
2008	1,659
2009	1,469
2010	1,534
2011	1,175
2012	1,407
2013	1,280
2014	1,061
2015	1,276
2016	1,368
2017	1,273
2018	1,287
2019	1,129
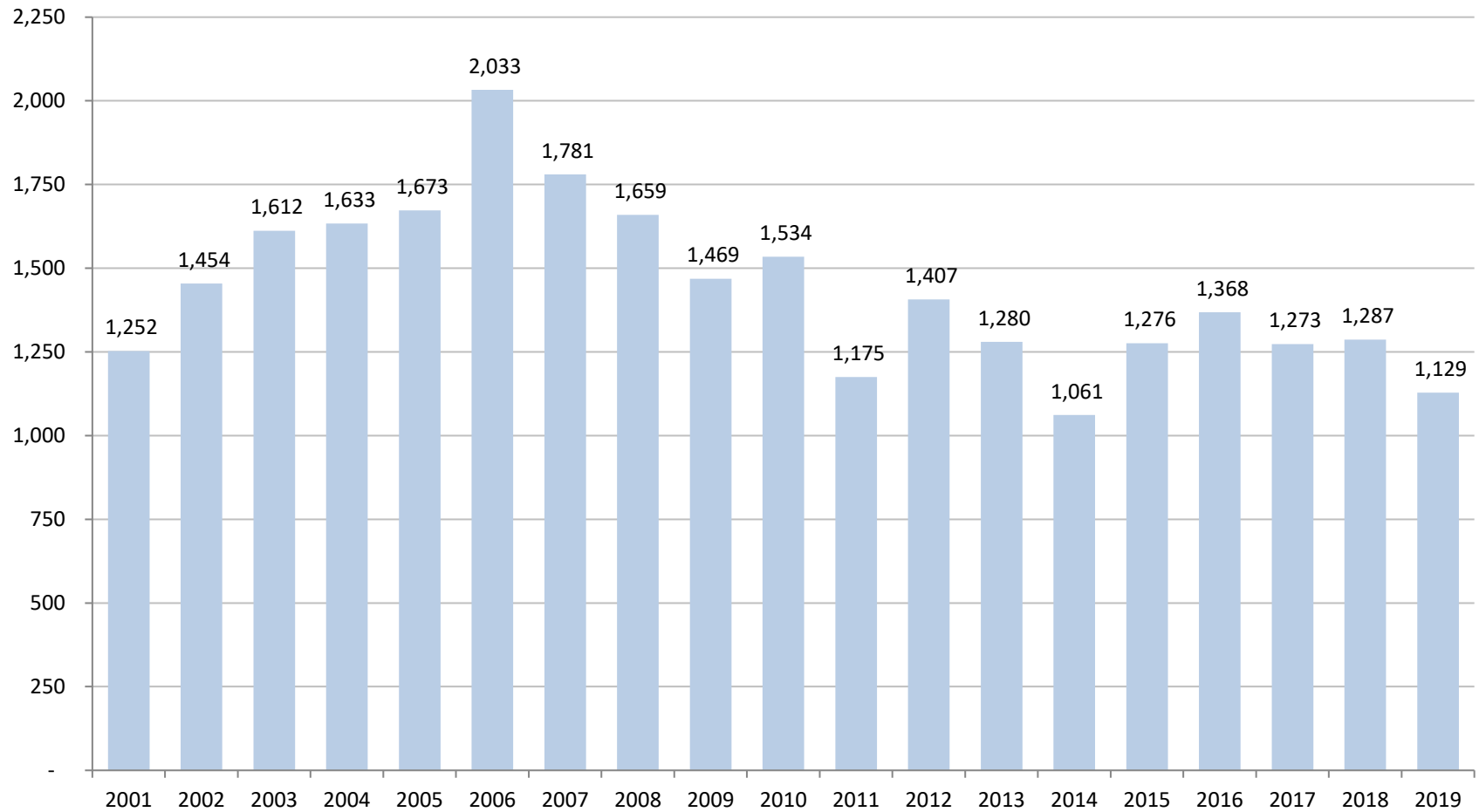
Number of ARRT-recognized programs by discipline:

Radiography

Data points (2001–2019): 590, 631, 639, 684, 715, 723, 729, 742, 746, 751, 751, 750, 741, 739, 736, 736, 727, 730, 734

Radiation Therapy

Data points (2001–2019): 86, 95, 101, 105, 113, 118, 122, 125, 122, 122, 123, 122, 121, 117, 113, 110, 110, 109, 106

Nuclear Medicine Technology

Data points (2001–2019): 101, 104, 111, 117, 122, 131, 132, 136, 136, 136, 134, 134, 128, 125, 122, 120, 117, 117, 116