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focus on

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Size of Undergraduate Physics and Astronomy Programs

Data from the AIP Enrollments and Degrees and Academic Workforce Surveys

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OTHER PUBLICATIONS WHICH MAY BE OF INTEREST

Equipping Physics Majors for the STEM Workforce (December 2014)

Roster of Physics Departments (September 2015)

Physics Bachelor's Degrees (November 2015)

Reports on Physics Faculty

SURVEY OF ENROLLMENTS AND DEGREES

Each fall, we ask degree-granting physics and astronomy departments to provide the number of undergraduate degrees they conferred in the previous academic year.

THE 2014 ACADEMIC WORKFORCE SURVEY

During the spring semester of 2014, we contacted all physics and astronomy degree-granting departments in the US and asked for the number of full-time equivalent faculty members they employ.

This *focus on* provides data on the size of degree-granting physics and astronomy departments by examining the number of bachelor's degrees awarded and the number of full-time equivalent (FTE) faculty members employed. The benchmarking data in this *focus on* is intended to allow physics and astronomy departments to see how they fit in the national landscape of physics and astronomy bachelor's degree production.

Table 1

Bachelor's Degrees and Number of Physics Departments Class of 2014

	Highest Physics Degree Offered			
	Bachelors	Masters	PhD	Total
Number of departments	496	56	192	744
Percent of departments	67	7	26	100
Average number of bachelor's degrees awarded	6.1	8.0	19.5	9.7
Median	5	7	13	7

Note: There are an additional 8 physics departments that do not grant bachelor's degrees. Degree data includes astronomy bachelors at the 39 combined physics and astronomy departments.

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The size of undergraduate physics and astronomy programs varies considerably by the highest degree a department offers; thus, the data in this *focus on* are presented separately for departments whose highest degree is a bachelors, masters, or PhD.

Bachelor's Degree-Granting Physics Departments

Departments that award a bachelor's as their highest physics degree are relatively small when compared to doctoral-granting physics departments, both in number of faculty members and the number of bachelor's degrees awarded. Even so, in the 2013-14 academic year, these 496 departments awarded 3,150, or 42%, of the 7,526 physics bachelor's degrees that year. Table 1 shows the average and median number of degrees conferred by type of department.

Slightly more than half of the physics departments that award a bachelor's degree as their highest degree averaged 5 or fewer degrees per year.

Table 2

Size of Bachelor's Class in Physics Departments Offering Only Bachelor's Degrees

Average number of bachelors over 3 years*	Number of departments	Cumulative %
0**	15	3
1	35	10
2	66	24
3	62	36
4	53	47
5	43	56
6	37	63
7	35	70
8	31	77
9	24	82
10	25	87
11	12	89
12-15	27	95
16-19	15	98
20+	12	100
Total number of departments	492	

*Rounded average: Classes of 2012, 2013, and 2014.

**Includes 10 departments that conferred one bachelor's degree during the 3 year period.

Note: Table includes the 492 departments that offered a bachelor's as their highest physics degree in 2014 and were also physics degree-granting in 2012 & 2013. Eighteen of these departments were combined physics and astronomy departments, and their astronomy bachelors are included in their degree data.

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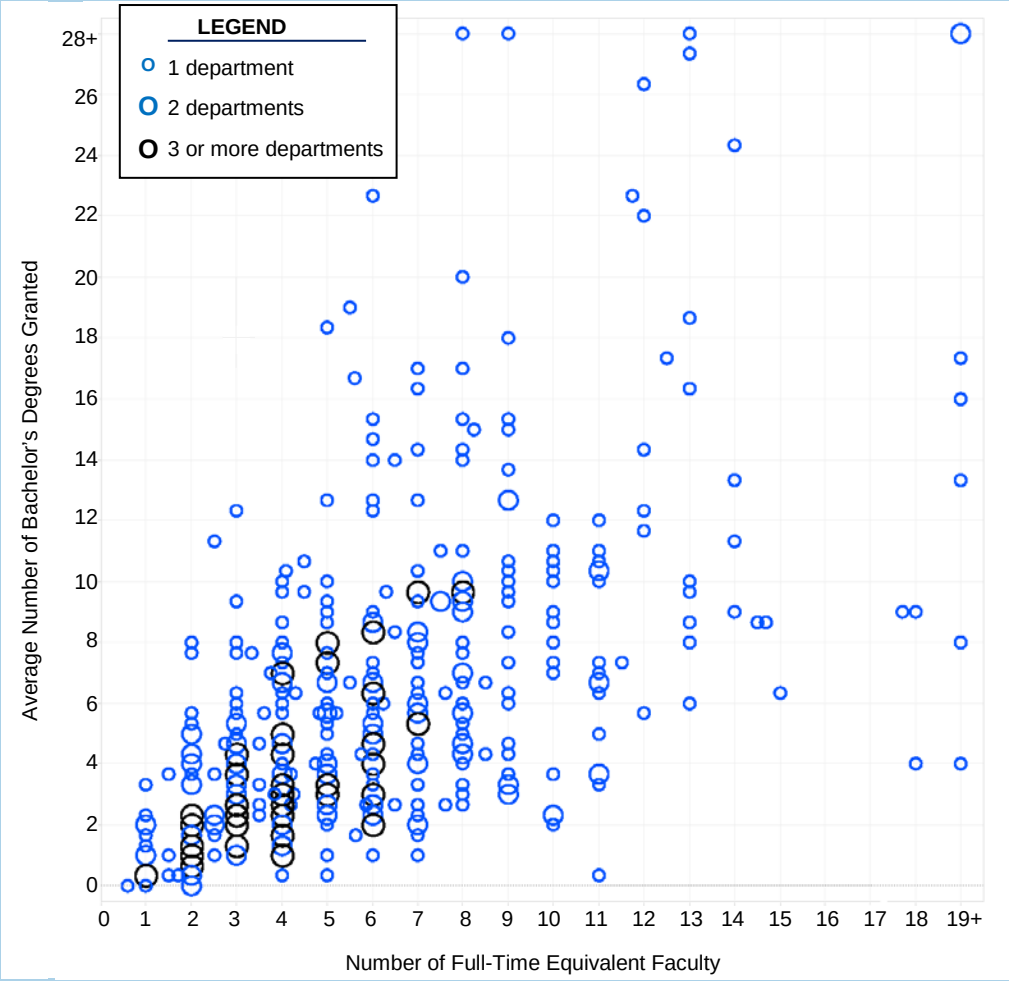
The number of bachelor's degrees awarded by a department is correlated with the number of full-time equivalent physics faculty they employ. Physics departments that award a bachelor's degree as their highest degree typically have between 3 and 8 FTE faculty members and granted an average of 6.3 and a median of 5 bachelor's degrees per department between 2012 and 2014. **Figure 1** shows this correlation.

Figure 1

Size of Bachelor's Class by Number of FTE Faculty in Physics Departments Offering Only Bachelor's Degrees



Note: The number of bachelors represents a rounded 3-year average (classes of 2012, 2013, and 2014). The number of faculty is for the 2014 academic year. Figure includes 454 departments that offered a bachelors as their highest degree for all 3 degree classes and provided their faculty data. www.aip.org/statistics

Physics departments that award a bachelor's degree as their highest degree typically have between 3 and 8 full-time equivalent faculty.

Master's Degree-Granting Physics Departments

Departments that award a master's degree as their highest degree are relatively uncommon among physics departments, comprising only 7% of the 744 departments with undergraduate physics programs in 2014. These master's-granting departments often fill an important niche in preparing students for both the workforce and for continued graduate studies.

About one-third of the physics departments that award a master's degree as their highest degree averaged 5 or fewer bachelor's degrees per year.

Table 3

Size of Bachelor's Class in Physics Departments Offering Master's as Highest Degree

Average number of bachelors over 3 years*	Number of departments	Cumulative %
0 or 1	3	5
2	2	9
3	3	14
4	3	20
5	8	34
6	6	45
7	5	54
8	7	66
9	2	70
10	5	79
11	3	84
12	1	86
13+	8	100
Total number of departments	56	

* Rounded average: Classes of 2012, 2013, and 2014.

Note: Table includes the 56 departments that offered a master's as their highest physics degree in 2014 and were also physics degree-granting in 2012 & 2013. Two of these departments were combined physics and astronomy departments and their astronomy bachelors are included in their degree data.

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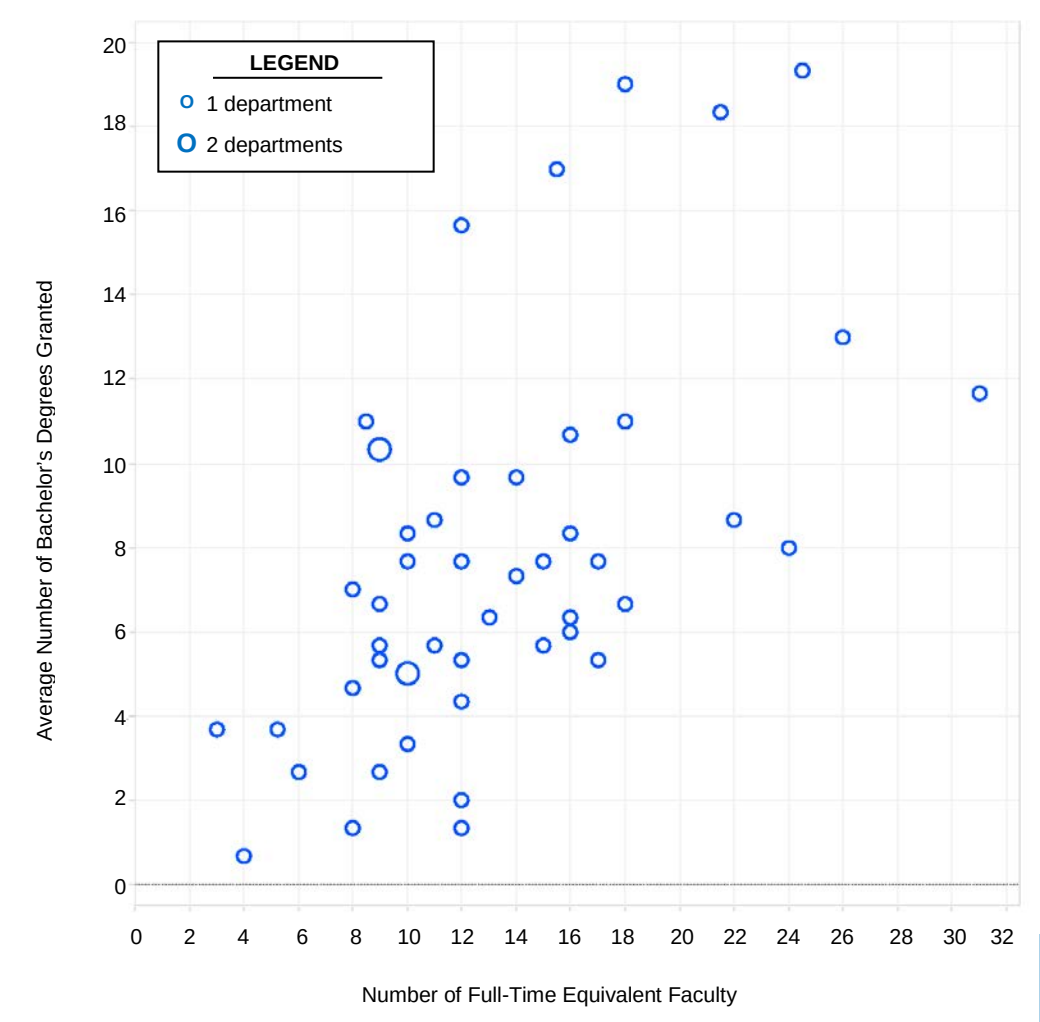
Physics departments that award a master's degree as their highest degree are larger than bachelor's-only departments and typically have between 9 and 16 full-time equivalent faculty members. These departments granted an average of 8.0 bachelor's degrees per department between 2012 and 2014. **Figure 2** shows the correlation between number of bachelor's degrees and FTE faculty members in master's-granting departments.

Figure 2

Size of Bachelor's Class by Number of FTE Faculty in Physics Departments Offering Master's as Highest Degree



Note: The number of bachelor's represents a rounded 3-year average (classes of 2012, 2013, and 2014). The number of faculty is for the 2014 academic year. Figure includes 49 departments that offered a master's as their highest degree for all 3 degree classes and provided their faculty data.

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Physics departments that award a master's degree as their highest degree typically have between 9 and 16 full-time equivalent faculty.

PhD-Granting Physics Departments

PhD-granting departments made up 26% of physics degree-granting departments in the US in 2014 and awarded a little over half (52%) of the bachelor's degrees conferred in recent years.

Table 4

Size of Bachelor's Class in Physics Departments Offering PhDs

Average number of bachelors over 3 years*	Number of departments	Cumulative %
1 or 2	4	2
3	3	4
4	7	7
5	7	11
6	10	16
7	12	23
8	7	26
9	9	31
10	8	35
11	5	38
12	13	45
13	9	49
14	8	53
15	8	58
16	2	59
17	6	62
18	2	63
19	4	65
20-24	13	72
25-29	17	81
30-34	10	86
34-39	2	87
40-44	5	90
45-49	3	91
50-54	6	94
55-59	4	96
60-64	0	96
65-69	2	97
70+	5	100
Total number of departments	191	

* Rounded average: Classes of 2012, 2013, and 2014.

Note: Table includes the 191 departments that offered the doctorate as their highest physics degree in 2014 and were also physics degree-granting in 2012 & 2013. Sixteen of these departments were combined physics and astronomy departments and their astronomy bachelors are included in their degree data.

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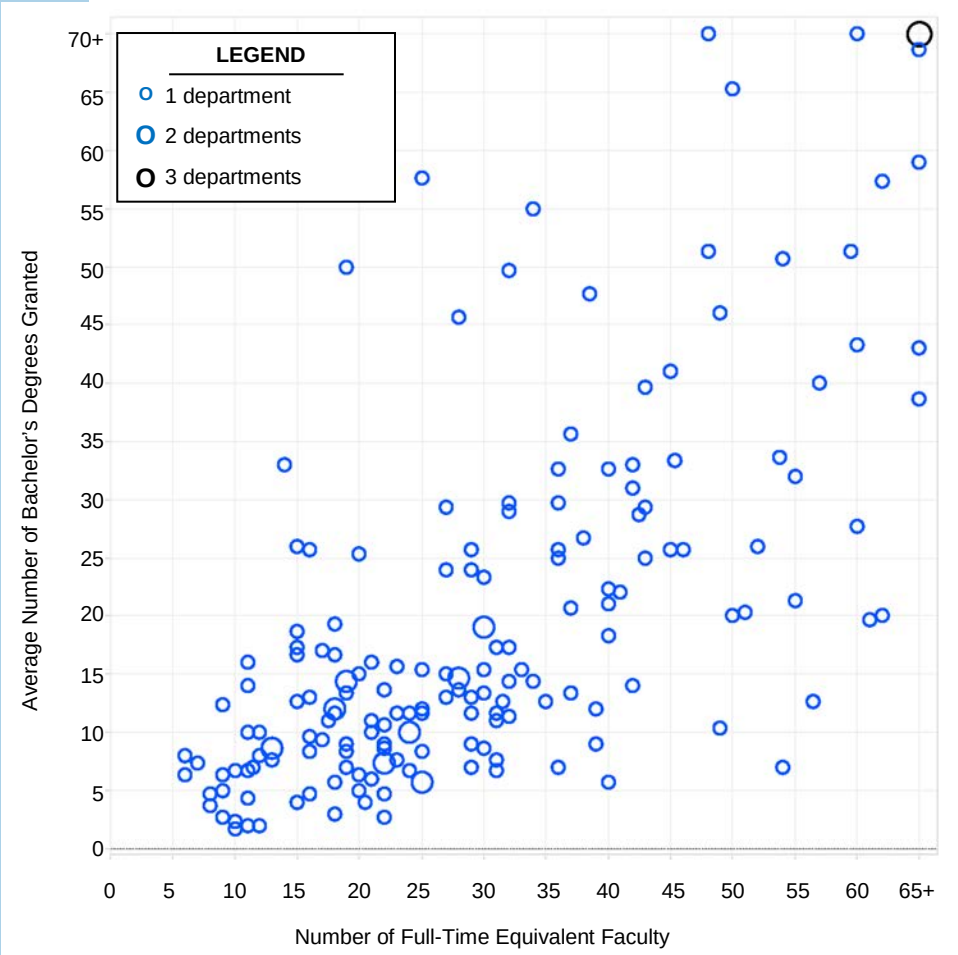
The undergraduate programs at PhD-granting physics departments vary considerably in size. There are a few (11%) relatively small departments averaging 5 or fewer bachelor's degrees and some very large ones (9%) averaging 50 or more bachelors. PhD-granting departments awarded an average of 19.5 bachelor's degrees annually between 2012 and 2014. It should be noted that the few very large PhD departments influence the average number of bachelor's conferred at these departments. In fact, the median number of bachelor's degrees at PhD departments is 13, much less than the average. **Figure 3** shows the correlation between the number of FTE faculty members and bachelor's degrees awarded by PhD-granting physics departments.

Figure 3

Size of Bachelor's Class by Number of FTE Faculty in Physics Departments Offering PhDs



Note: The number of bachelors represents a rounded 3-year average (classes of 2012, 2013, and2014). The number of faculty is for the 2014 academic year. Figure includes 179 departments that offered a PhD as their highest physics degree for all three degree classes and provided their faculty data.

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PhD-granting physics departments vary greatly in size with the number of full-time equivalent faculty ranging from 6 to 85. Typically, PhD-granting departments have between 18 and 40 full-time equivalent faculty members.

Astronomy Departments

In the academic year 2013-14, there were 72 departments in the US that conferred undergraduate astronomy degrees. Of these departments, 33 were separate astronomy departments, and 39 were part of a combined physics and astronomy department. The data in **Table 5** and **Figure 4** include data for only the 33 separate astronomy departments.

Astronomy departments awarded an average of 8.5 astronomy bachelor's degrees between 2012 and 2014.

Table 5

Astronomy Bachelor's Degrees and Number of Astronomy Departments, Classes of 2012, 2013 and 2014

	Highest Astronomy Degree Offered			
	Bachelors	Masters	PhD	Total
Number of separate astronomy departments	6	2	25	33
Average number of bachelor's degrees awarded	3.9	3.7	9.9	8.5

Average astronomy bachelor's degree data is based on a 3-year average (classes of 2012, 2013, and 2014). This table only includes the 33 separate astronomy departments. Additionally, there are 39 combined physics and astronomy departments. The astronomy degree data for the combined departments are included in the physics department tables and figures.

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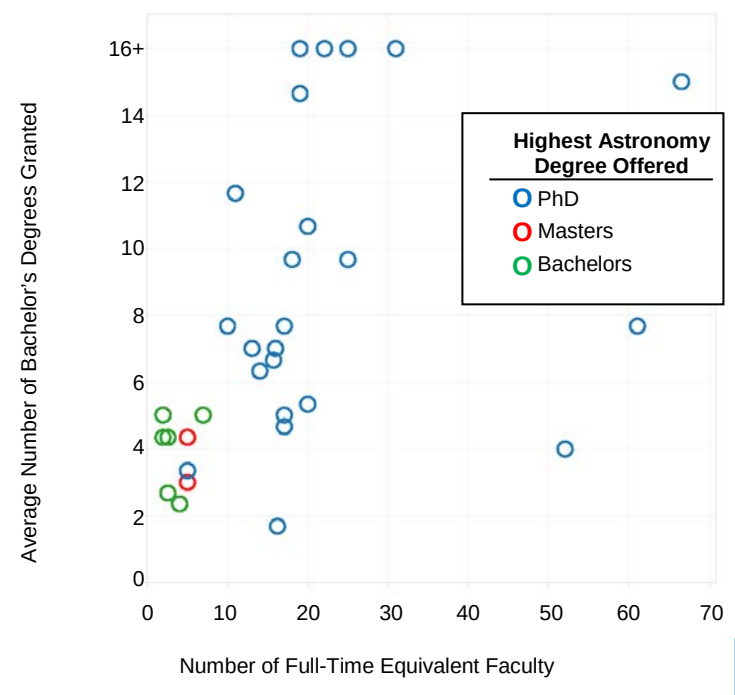
In the 2013-14 academic year, separate astronomy departments had between 2 and 66.5 FTE faculty members and averaged 8.5 astronomy bachelor's degrees between 2012 and 2014. **Figure 4** shows the correlation between the number of FTE faculty members and bachelor's degrees awarded by the separate astronomy departments.

There is considerably more variation in the number of bachelors conferred and full-time equivalent faculty at separate PhD-granting astronomy departments than at astronomy departments where a bachelors or masters is the highest degree offered.

Figure 4

Size of Bachelor's Class by Number of FTE Faculty In Separate Astronomy Departments



Note: The number of astronomy bachelors represents a rounded 3-year average (classes of 2012, 2013, and 2014). The number of faculty is for the 2014 academic year. Figure includes 31 out of 33 separate astronomy departments that provided their faculty data. The data for astronomy bachelors receiving their degrees from combined physics and astronomy departments are included in the physics department figures.

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Conclusion

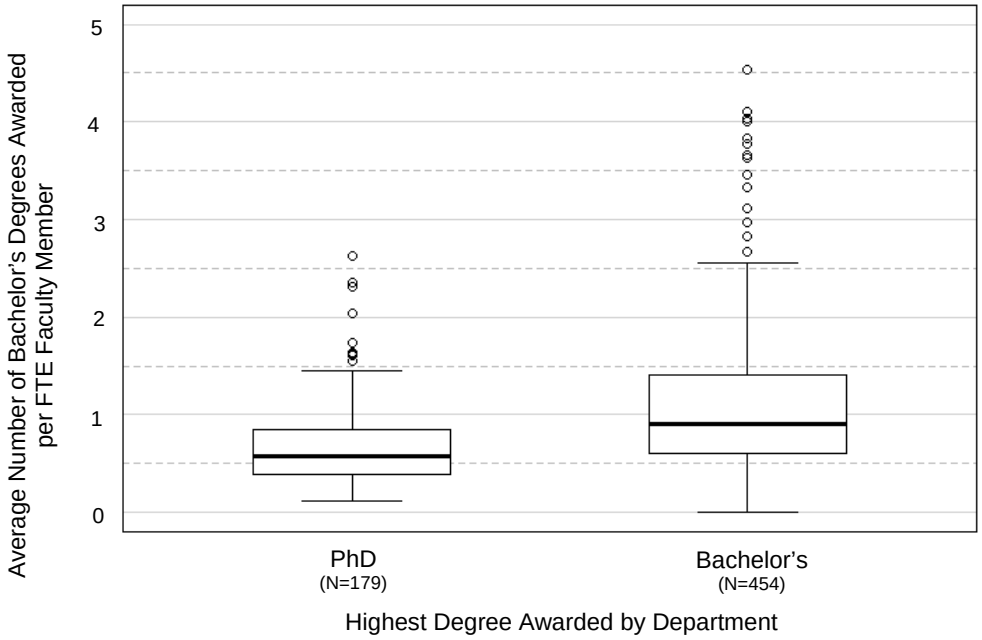
Bachelor's-granting departments produce more bachelors per FTE faculty member than PhD-granting departments.

The number of bachelor's degrees awarded by a department is correlated with the number of full-time equivalent faculty members they employ, and the correlation varies by highest degree offered by the department. The bachelor's-only departments had a median of 5 bachelors conferred with a typical number of 4 to 9 FTE faculty members. PhD-granting departments had a median of 13 bachelors conferred with a typical number of 18 to 40 FTE faculty members.

While keeping in mind that some faculty members at PhD-granting departments may not have any undergraduate teaching responsibilities and instead focus on graduate students or research, bachelor's-granting departments produce more bachelors per FTE faculty member than PhD-granting departments. Figure 5 shows that 25% of bachelor's-granting departments produce about 1.5 bachelors or more per FTE faculty member. However, this is true only for about 5% of PhD-granting departments.

Figure 5

Average Number of Bachelor's Degrees Awarded per FTE Faculty Member in Physics Departments



The box depicts the middle 50% of the departments with the line at the median. The upper line outside the box (whisker) extends from the upper quartile 1.5 times the range for the middle 50% of departments. The lower whisker represents the minimum value. The circles above the whiskers are considered outliers. Faculty member data is for the 2013-14 academic year. The number of bachelors represents a 3-year average (classes of 2012, 2013, and 2014).

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