AIP American Institute of Physics

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A publication of the AIP Statistical Research Center
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June 2013

Number of Physics Faculty in Two-Year Colleges

Results from the 2012 Survey of Physics in Two-Year Colleges

Susan White and Raymond Chu

Reports on Physics in Two-Year Colleges

Physics Enrollments in Two-Year Colleges (April 2013)

Number of Physics Faculty in Two-Year Colleges (June 2013)

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The 2012 Survey of Physics in Two-Year Colleges

During the spring semester of 2012, we attempted to contact all of the academic units on two-year college campuses in the US that were responsible for the physics classes on their campus.

Physics at Two-Year Colleges

In an earlier report, (*focus on Physics Enrollments in Two-Year Colleges-April 2013*), we examined physics enrollments – both the number of students and the types of classes taught – at the 1,063 two-year college campuses in the US where we believe physics is offered. This report focuses on the faculty members who teach those courses – how many, how many are on one campus, how they are employed (full- or part-time), whether they teach courses other than physics, and how many are women. First, though, we consider the place of physics at two-year colleges (TYCs).

Table 1

Academic Units where Physics is Housed on Two-Year College Campuses, 2011-12

Academic unit name includes the term …	Prevalence
Science	93%
Math *Example: "Division of Science and Mathematics"*	45%
Arts *Example: "Division of Arts & Sciences"*	18%
Natural *Example: "Division of Natural Sciences"*	14%
Engineering *Example: "Division of Science, Mathematics, and Engineering*	13%
Technology *Example: "Division of Mathematics, Science, and Technology"*	9%
Physical *Example: "Division of Math and Physical Sciences"*	7%

Note: Since academic unit names may include more than one word in the list, totals do not sum to 100%.

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Finding Physics at Two-Year Colleges

At most four-year schools which offer a degree in physics, physics is housed in its own academic unit – the department of physics. While there are schools which house physics with other disciplines, for example a department of physical sciences, those are the exception at four-year schools. However, at two-year colleges (TYCs), physics is rarely a stand-alone academic unit. Furthermore, the name of the unit which houses physics can differ from campus to campus even at various branches of the *same* institution. We looked at the academic units where we found physics on each campus. In almost every case (93%), the unit name included the term Science or Sciences. **Table 1** (front page) lists several terms commonly found in the names of academic units which house physics on TYC campuses. After the word "Science," the next most common was "Math" or "Mathematics," with 45% of the campuses housing physics in an academic unit which included math. At 18% of the campuses, units with "Arts" or "Liberal Arts" in their title house physics in a Division of Arts and Sciences. "Engineering" was in about 13% of the division names.

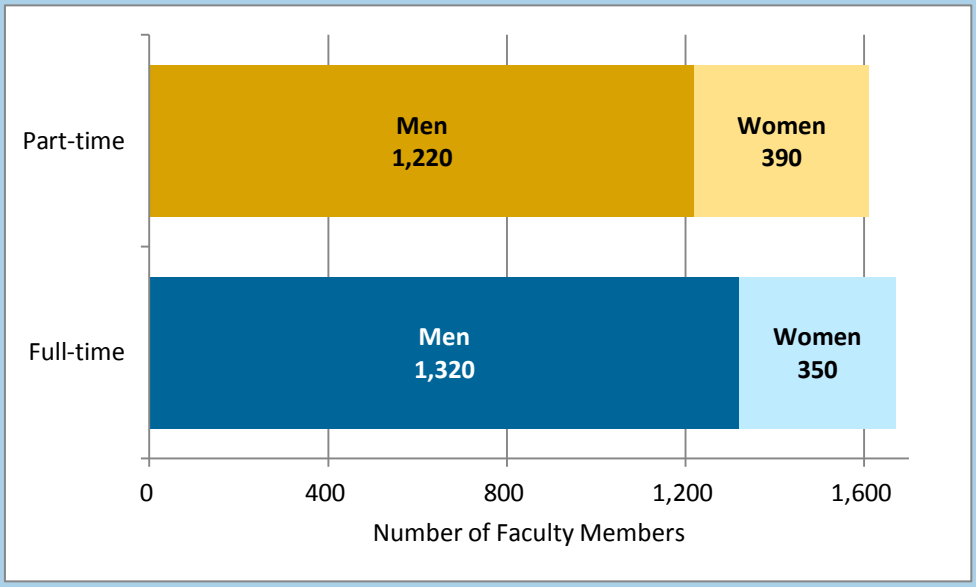
Physics (and Astronomy) Faculty Members

The 2011-12 Survey of Physics in Two-Year Colleges marks our third round of study of physics in TYCs. In the first two studies, we did not include astronomy among the classes for which we collected data. In the current study, we chose to include astronomy for the first time. While the inclusion of astronomy allows us examine astronomy enrollments, it means that the estimates for the number of faculty members are not directly comparable with data from previous years. While it is unlikely, it is possible that some of the faculty members listed may teach astronomy courses only. It is not clear whether respondents would have included these among the number of physics faculty members they reported in previous years.

As shown in **Figure 1** (page 3), almost 3,300 faculty members taught physics courses at two-year colleges during the 2011-12 academic year. The split was almost even with 51% of the faculty members appointed in full-time positions and 49% serving part-time. According to data from the US Department of Education's *Digest of Education Statistics (2011)*, 34% of all instructional personnel in two-year colleges were full-time. This suggests that physics faculty members are more likely to be full-time than typical faculty members at TYCs.

Figure 1

Number of Physics‡ Faculty Members at Two-Year Colleges by Status and Sex, 2011-12



‡ **The list of courses on the questionnaire included astronomy classes. Since astronomy classes were not included on the questionnaire in earlier years, these numbers should not be compared to those from previous studies we have conducted.**

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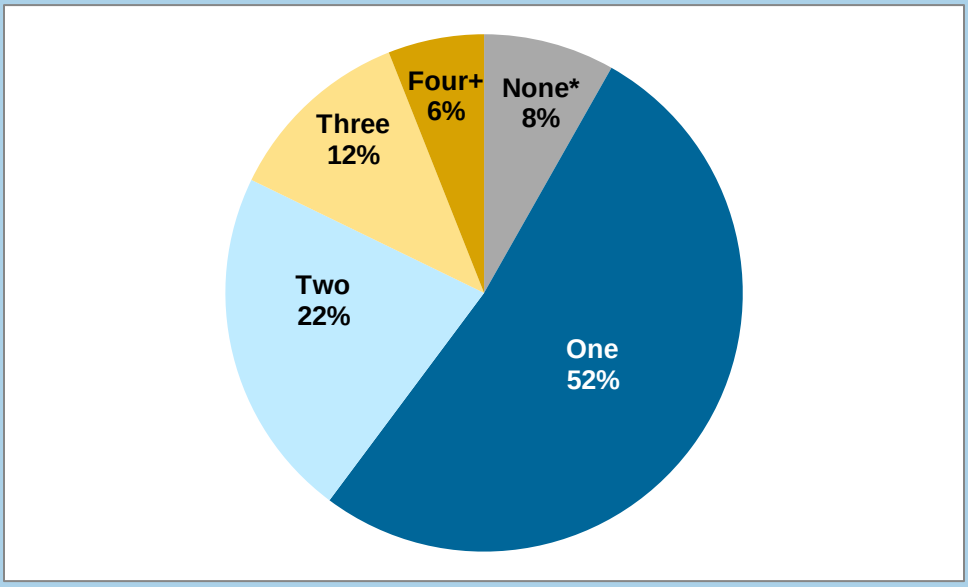
Just over half (51%) of the physics faculty members at TYCs are in full-time positions.

Overall, 23% of the faculty members were women. The representation of women among part-time faculty members (24%) was higher than among full-time faculty members (21%). More than half of the women (390 out of 740, or 53%) were in part-time positions; 48% of the men (1220 out of 2540) held part-time appointments. Women's representation among faculty members teaching physics in two-year colleges is slightly higher than that in degree-granting departments in four-year schools. It is on par with the proportion of women among Assistant Professors in degree-granting departments.

Sixty percent of the academic units which house physics have one or zero full-time faculty members teaching physics classes.

Figure 2

Number of Full-Time Faculty Members Teaching Physics‡ per Department
Two-Year Colleges Offering Physics Courses, 2011-12



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* In departments with no full-time faculty members, part-time faculty members taught the physics courses.

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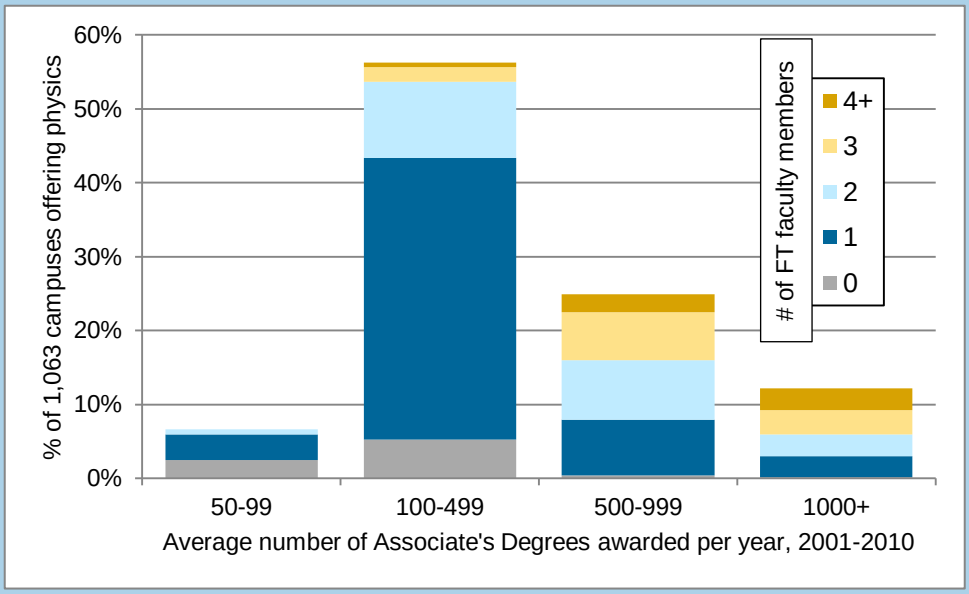
Figure 2 shows the number of full-time faculty members who taught at least one physics class per department. Sixty percent of departments where physics is taught have at most one full-time faculty member who teaches physics. (Some have no full-time faculty members who teach physics.) Full-time faculty members in these "solo" departments account for about one-third of all full-time faculty members, and they are likely to feel isolated.

We also looked at the number of full-time faculty members by the size of the campus. Well over half (56%) of the 1,063 campuses where physics is offered awarded an average of 100 – 499 associate's degrees each year between 2001 and 2010, and two-thirds of these campuses had one full-time faculty member teaching physics. This is depicted in **Figure 3**. Almost all of the smallest campuses (those averaging fewer than 100 associate's degrees awarded) had one or no full-time faculty members teaching physics, and three-fourths of the largest campuses (awarding an average of 1,000 associate's degrees or more) had two or more full-time faculty members teaching physics.

Figure 3

Number of Full-Time Physics‡ Faculty Members Teaching Physics at Two-Year Colleges (2011-2012)
by Average Number of Associate's Degrees Awarded Each Year on Each Campus(2001-10)



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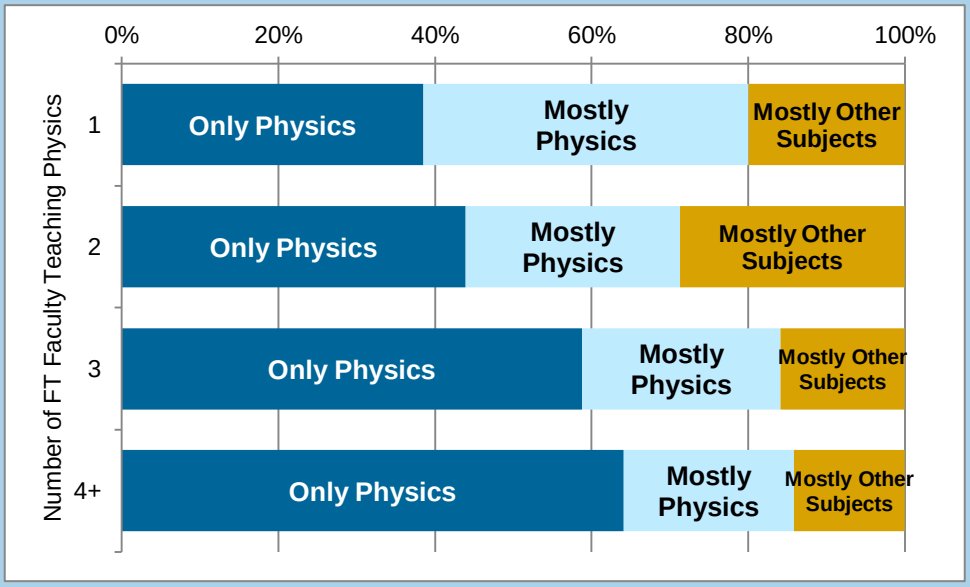
Larger campuses were more likely to have two or more full-time faculty members teaching physics.

Not only are the solo physics faculty members the lone physicist on their campus; they are also more likely than their colleagues at larger schools to teach courses in disciplines other than physics. **Figure 4** (page 6) shows that, as the number of full-time faculty members in departments increases, so does the proportion of faculty who devote all of the instructional efforts to physics. On campuses where two full-time faculty members taught physics, those faculty members were most likely to devote time – either by necessity or by choice – to teaching classes outside physics. This could be a function of growth in physics enrollments beyond what one faculty member could cover. So, having a second full-time colleague teaching physics does not necessarily imply that the additional faculty member focuses on physics. Yet, in units with three or more full-time faculty members teaching physics, about 85% of those faculty members teach only physics or mostly physics.

Figure 4

Full-Time Physics‡ Faculty Teaching Responsibilities at Two-Year Colleges by Number of Full-Time Faculty in the Department, 2011-12



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As more full-time faculty members teach physics, a higher proportion teaches only physics.

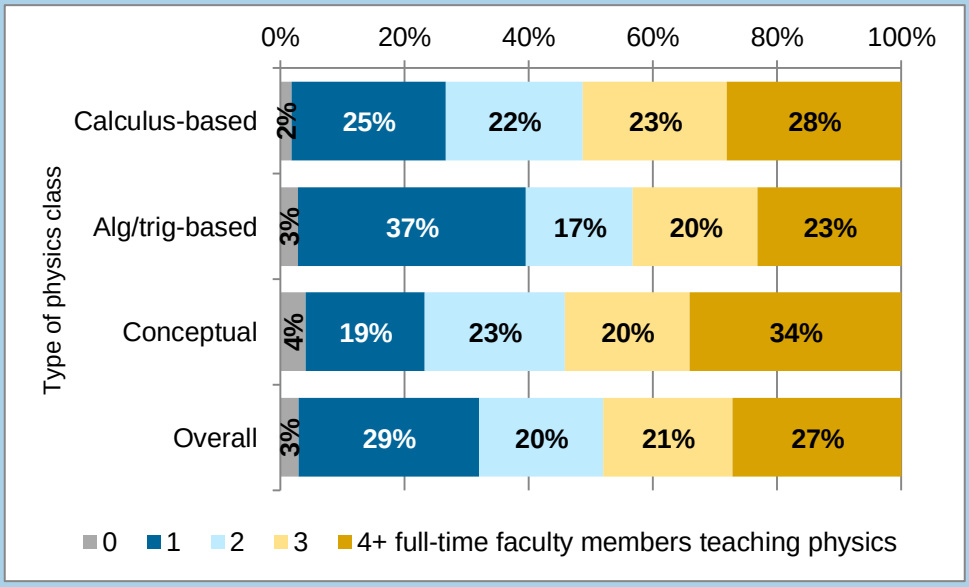
Part-time Faculty Members

Recall (Figure 2 on page 4) that 8% of the 1,063 departments offering physics courses at two-year colleges in 2011-12 had no full-time faculty members. All of the physics offerings at these schools were taught by part-time faculty members. One might wonder what proportion of TYC physics students are taught on campuses with no full-time faculty member teaching physics.

In an earlier report (*focus on Physics Enrollments in Two-Year Colleges-April 2013*), we provided information on the number of students taking physics courses at two-year colleges. We found that over 160,000 students took calculus-based, algebra-trig-based, or conceptual physics courses at TYCs during the 2011-12 academic year. A closer look reveals that about 3% of these students were taught at schools with no full-time physics faculty members (**Figure 5**).

Figure 5

Proportion of Students Enrolled in Various Physics Classes at TYCs by Number of Full-time Faculty who Teach Physics‡, 2011-12



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Campuses with no full-time faculty members teaching physics accounted for only 3% of the students enrolled in introductory physics courses at TYCs.

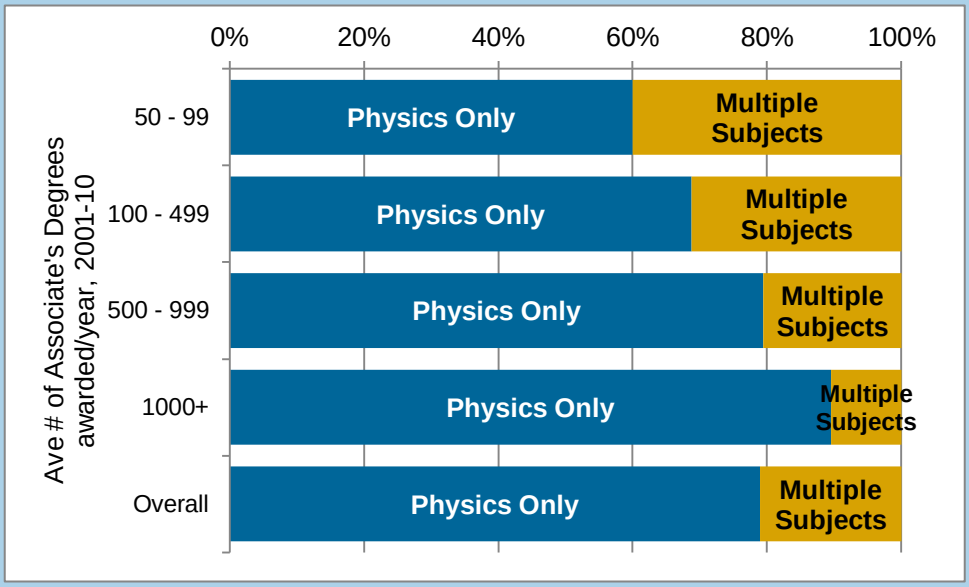
While 8% of the departments that are responsible for physics at TYCs have no full-time faculty members who teach physics, these account for only 3% of the students taking physics. Knowing that this 8% of departments accounts for only 3% of the student might still leave one wondering whether these part-time faculty members taught only physics or taught other courses in addition to physics.

We asked about the courses part-time faculty members taught. Overall, about 80% of the part-time faculty members who taught physics courses at two-year colleges taught *only* physics courses; the remainder taught multiple subjects which included physics. When we examine these data by the size of the campus (as defined by average number of associate's degrees awarded), we see that the part-time faculty members on smaller campuses were more likely to teach multiple subjects; this is depicted in **Figure 6**. It is possible that administrators on smaller campuses are more likely to use part-time faculty members to teach classes in two (or more) different subject areas. It is also possible that the part-time faculty members on the larger campuses who do teach more than one class are able to focus on physics without teaching other subjects.

Part-time physics faculty members at smaller campuses were more likely to teach other subjects in addition to physics.

Figure 6

Part-Time Physics‡ Faculty Teaching Responsibilities at Two-Year Colleges
by Average Number of Associate's Degrees Awarded per Year, 2001-10



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Survey Methodology

In the Fall of 2011, we compiled a list of TYC campuses which we believed offered physics and likely best physics contacts at those campuses. We reached out to AAPT members at TYCs to help insure we were including all campuses we should. We also worked with the American Chemical Society (ACS) when we learned they would be conducting a survey of chemistry in TYCs since physics and chemistry are often in the same administrative unit at TYCs. We also visited the website or contacted someone at 80 campuses – oversampling small campuses – to help us better determine where physics was and was not offered.

Between March 1 and June 30, 2012, we attempted to reach the physics contact by e-mail multiple times. On June 12, we sent a postcard to approximately 600 campuses which had not yet responded. We had a physics contact for 111 of those campuses; the remaining postcards were addressed to "Physics Faculty".

We received useable responses from 442 campuses; this is 42% of the campuses we believe offer physics. Final estimates were scaled based on the number of associate's degrees awarded. We received a higher proportion of responses from larger schools, and a smaller proportion from smaller schools, but the results have been adjusted to reflect that.

We offer sincere gratitude to all those who helped compile this data. If you have any questions or comments, please contact Susan White at swhite@aip.org.

e-Updates

Thank you for your interest in our study of physics in two-year colleges. We also have data physics in US high schools, physics in degree-granting departments, underrepresented minorities in physics, global physics, and careers. If you would like to be notified when we post a new report on a topic that interests you, please sign up for our data alerts at www.aip.org/statistics/e_updates.

We promise not to share your contact information with any other parties. We send out a total of about 20 e-Updates each year, so we shouldn't fill up your inbox.