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High School Physics Courses & Enrollments

Results from the 2008-09 Nationwide Survey of High School Physics Teachers

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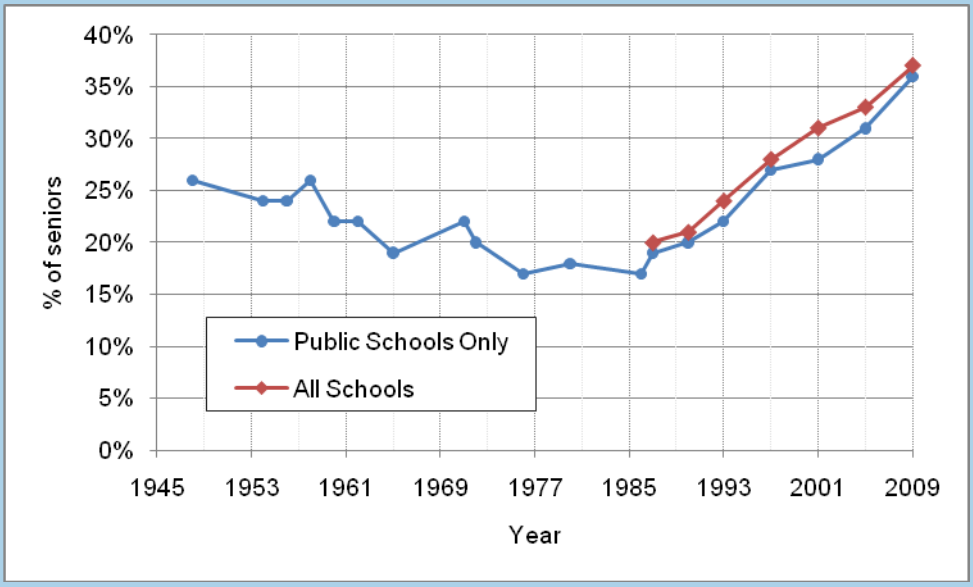
1.35 Million Students in Physics Courses

AIP has been tracking physics in U.S. high schools since 1987. During that time, we have seen steady growth in the number of students taking physics in U.S. high schools. In 2004-05, enrollments topped 1 million students for the first time. By 2008-09, more than 1.3 million students were enrolled in physics courses in U.S. high schools. We have also seen a steady increase in "physics taking", the proportion of high school graduates who will have taken at least one physics course prior to graduation. As shown in Figure 1, we estimate that 37% of the students who graduated from U.S. high schools during the 2008-09 academic year (both public and private) had taken at least one physics course before graduation.

Figure 1

Physics Enrollment* in U.S. High Schools: 1948 – 2009

***Percent of seniors who have taken at least one physics course prior to graduation**



Source: 1987 – current, AIP; data prior to 1987 from NCES

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Reports on High School Physics

High School Physics Availability (April 2010)

High School Physics Courses & Enrollments (August 2010)

Who Teaches High School Physics (November 2010)

Under-Represented Minorities in High School Physics (March 2011)

Females in High School Physics (July 2011)

The 2008-09 Nationwide Survey of High School Physics Teachers

During the 2008-09 academic year, we contacted a representative national sample of about 3,600 public and private high schools across the U.S. to inquire about physics availability and offerings. These reports describe our findings.

Physics Curriculum Continues to Diversify

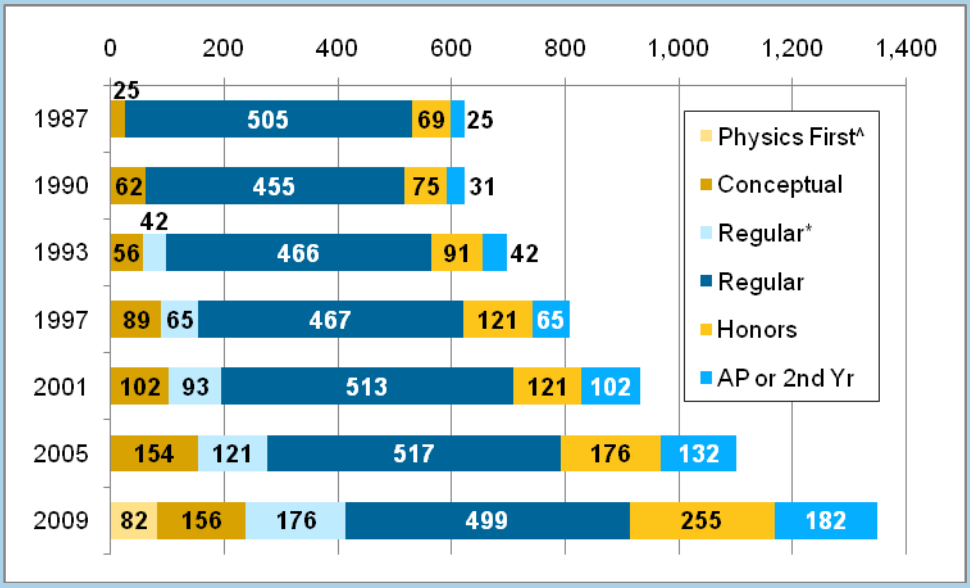
In 1986-87, we saw about 500,000 students enrolled in the regular, algebra-based high school physics course; those students accounted for four-fifths of all physics students. This year we again find that about 500,000 students are taking "regular" high school physics, but they comprise less than half the students taking a high school physics course. (An additional 176,000 are taking "regular" physics taught using a conceptual text.)

Both conceptual and advanced physics have increased enrollments; this growth is depicted in Figures 2 and 3. Figure 2 depicts the growth in the number of students taking physics and provides the number of students (in thousands) enrolled in each type of course. Figure 3 shows the changes in the proportion of students enrolled in each type of course since 1987.

Total high school physics enrollments have more than doubled since 1990.

Figure 2

Physics Enrollment in U.S. High Schools by Type of Course, 1987 – 2009
(numbers in 1,000s)



^ Physics First was explicitly included in the list of courses for the first time on the 2008-09 survey.

***Regular course taught using conceptual text.**

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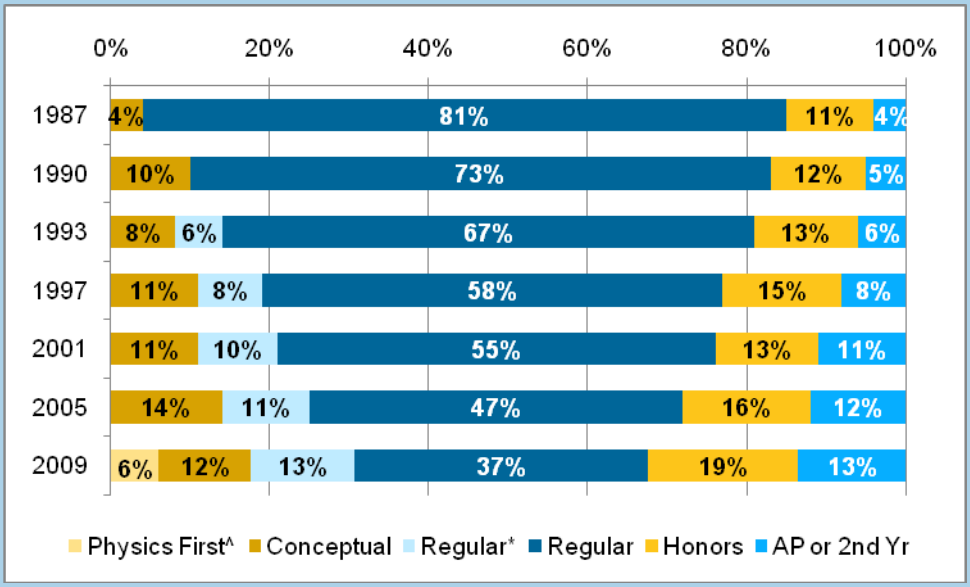
Figure 3

High School Physics Enrollment Distribution by Type of Course, 1987 – 2009



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***Regular course taught using conceptual text.**

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The growth in total enrollment in high school physics courses— from 624,000 in 1987 to 1,350,000 in 2009— has come from increased enrollment at both ends of the spectrum of courses, conceptual physics and advanced physics.

Although the proportion has declined, the number of students enrolled in the regular, algebra-based physics course has remained relatively stable (about 500,000). The growth in total enrollment in high school physics courses has come from increases at both ends of the course spectrum, conceptual physics and advanced physics. Enrollment in conceptual physics courses, which includes Physics First, conceptual physics, and regular physics taught using a conceptual text, has grown from 25,000 students in 1987 to over 400,000 students in 2009. Similarly, enrollment in honors, Advance Placement (AP), and second-year physics courses grew from 94,000 students to over 437,000 students during the same time frame.

Course Offerings by Type of School

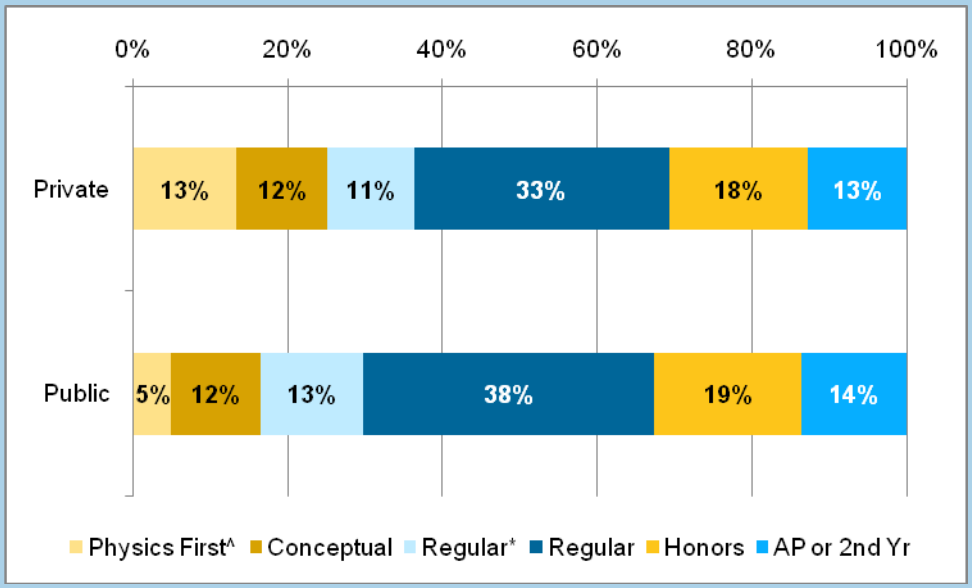
Private schools have a higher proportion of students enrolled in Physics First than public schools (see Figure 4). In 2005, we found that about 4% of all U.S. high schools had implemented some variant of Physics First — 3% of all public schools and 8% of all private schools. In 2009, we again estimate that 4% of U.S. high schools offer Physics First; the proportion of public and private schools offering Physics First has not changed significantly.

About 36% of seniors graduating from public high schools in the U.S. in 2009 had completed a physics course prior to graduation; in private schools approximately 53% of graduating seniors had done so. For the 2008-09 academic year, 1.17 million students were enrolled in physics courses in public high schools in the U.S.. Private high schools enrolled about 180,000 students in physics courses that year.

Private schools have a higher proportion of students enrolled in Physics First.

Figure 4

High School Physics Enrollment Distribution by Type of Course Public and Private U.S. High Schools, 2009



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***Regular course taught using conceptual text.**

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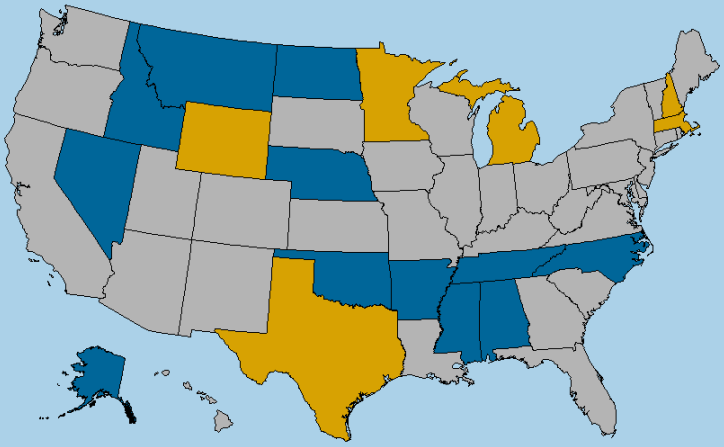
Figure 5

Physics Taking in U.S. High Schools 2008-09



Legend
- Significantly higher than U.S. average of 37%
- Not significantly different from U.S. average of 37%
- Significantly lower than U.S. average of 37%

Physics taking is defined as the proportion of seniors who will have taken at least one physics course prior to graduation.

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In many states, the physics-taking rate does not differ significantly from the U.S. average of 37%.

State-by-State Variation in Physics Taking

Our ***focus on High School Physics Availability*** examined the state-by-state variation in physics availability. We now look at state-by-state variation in physics taking. In Figure 5 we see that the physics-taking rate in many states does not differ statistically from the national average of 37%. There are bands of states across the southeast, south central, and in the northwest U.S. in which physics taking is below the national average. If we compare physics-taking rates to physics availability — as measured both by the proportion of students who attend schools where physics is taught every year and by the proportion of students who attend schools where physics is never taught — we do see some evidence to suggest that availability affects the physics-taking rate.

The number of years of high school science required before graduation varies from state to state and, in some cases, within a state. In comparing state high school graduation standards with physics taking in each state, we find little evidence to suggest that increasing the science requirements increases physics taking. None of the states with the

highest physics-taking rates required 4 years of science for 2008-09 graduates. In four of these states, 3 years of science were required for 2008-09 graduates, one required 2 years, and the requirements were determined by local school boards in one case (Massachusetts). Conversely, two of the lowest physics-taking states *did* require 4 years of science for graduation, and most of these below average states required 3 years of science.

Survey Methodology

In the fall of 2008, we contacted a representative sample of over 3,600 high schools in the U.S., both public and private, to determine whether or not physics was taught there. We received responses from over 99% of the schools. For the schools which indicated they were offering physics, we obtained contact information for the teachers. In the spring of 2009, we contacted each of the teachers who were thought to be teaching physics. We received responses from over 2,500 teachers (a 62% response rate). Our findings are based on their responses.

For a copy of the principal survey or the teacher survey, please contact Susan White at swhite@aip.org.

We are able to conduct this research only with the gracious help of the more than 6,000 people who provided responses, including an administrator at each school and each of the teachers who responded. We are deeply grateful for their assistance and their time.

This marks the seventh time we have conducted a survey examining physics in U.S. high schools. The first six studies were directed by Michael Neuschatz, who retired from AIP in 2008. We hope to continue the tradition of excellent work in this area that he began.