Science, Mathematics, and Computer Science Courses

Overview

The 2018 NSSME+ collected data on science, mathematics, and computer science course offerings in the nation's schools. Teachers provided information about time spent on science and mathematics instruction in the elementary grades; titles and duration of secondary science, mathematics, and computer science courses; class sizes; gender and racial/ethnic composition; and prior achievement levels. These data are presented in the following sections.

Time Spent in Elementary Science and Mathematics Instruction

Self-contained elementary teachers were asked how often they teach mathematics and/or science. As can be seen in Table 4.1, mathematics is taught in virtually all classes on most or all school days in both grades K–3 and 4–6. In contrast, science is taught less frequently, with only 17 percent of grades K–3 classes and 35 percent of grades 4–6 classes receiving science instruction all or most days, every week of the school year. Many elementary classes receive science instruction only a few days a week or during some weeks of the year.

Table 4.1
Frequency With Which Self-Contained Elementary Teachers Teach Science and Mathematics, by Subject

	PERCENT OF CLASSES	
	SCIENCE	MATHEMATICS
Grades K–3		
All/Most days, every week	17 (1.5)	99 (0.2)
Three or fewer days, every week	40 (1.8)	1 (0.2)
Some weeks, but not every week	43 (2.0)	0 (0.1)
Grades 4–6		
All/Most days, every week	35 (3.1)	99 (0.4)
Three or fewer days, every week	36 (3.1)	1 (0.4)
Some weeks, but not every week	29 (2.4)	0 ---†

† No grades 4–6 teachers in the sample selected this response option. Thus, it is not possible to calculate the standard error of this estimate.

The survey also asked the approximate number of minutes typically spent teaching mathematics, science, social studies, and reading/language arts in self-contained classes. The average number of minutes per day typically spent on instruction in each subject in grades K–3 and 4–6 is shown in Table 4.2; to facilitate comparisons among the subject areas, only teachers who teach all four of these subjects to one class of students were included in this analysis. In 2018, grades K–3 self-contained classes spent an average of 89 minutes per day on reading instruction and 57 minutes on mathematics instruction, compared to only 18 minutes on science and 16 minutes on social studies instruction. The pattern in grades 4–6 is similar, with 82 minutes per day devoted to reading, 63 minutes to mathematics, 27 minutes to science, and 21 minutes to social studies instruction.

Table 4.2
Average Number of Minutes Per Day Spent Teaching Each Subject in Self-Contained Classes,† by Grade Range

	NUMBER OF MINUTES	
	GRADES K–3	GRADES 4–6
Reading/Language Arts	89 (1.7)	82 (2.4)
Mathematics	57 (0.8)	63 (1.6)
Science	18 (0.5)	27 (0.8)
Social Studies	16 (0.4)	21 (0.8)

† Includes only self-contained elementary teachers who indicated they teach reading, mathematics, science, and social studies to one class of students.

Science, Mathematics, and Computer Science Course Offerings

Middle and high schools were asked about course offerings in each subject. Schools were also asked about opportunities for students to take courses not offered on site, such as virtually or at another school.

For science, middle schools were asked whether they offer single-discipline courses (e.g., life science, physical science), coordinated/integrated science courses, or both in each grade 6–8 contained in the school. As can be seen in Table 4.3, 45 percent of schools containing 6th grade offer only coordinated/integrated science, and 35 percent offer only single-discipline courses; in grades 7 and 8, the percentage of schools offering only coordinated/integrated science is approximately the same as the those offering only single-discipline courses (about 40 percent). Fewer than 1 in 5 schools containing these grades offer both types of courses.

Table 4.3
Type of Middle School Science Courses Offered, by Grade

	PERCENT OF SCHOOLS		
	GRADE 6	GRADE 7	GRADE 8
Multi-Discipline Science Courses Only	45 (3.5)	41 (3.5)	42 (3.4)
Single-Discipline Science Courses Only	35 (3.5)	40 (3.8)	40 (3.7)
Both	19 (3.2)	18 (3.0)	18 (2.9)

Table 4.4 shows science courses offered in high schools. Almost all schools (97 percent) with grades 9–12 offer courses in biology/life science, with 70 percent offering non-college prep courses, 73 percent offering 1st year college preparatory courses, and 60 percent offering at least one 2nd year biology/life science course. Overall, 94 percent of high schools offer some form of chemistry course. First-year college prep chemistry courses are offered in 72 percent and 2nd year chemistry in 45 percent of high schools. Most high schools (82 percent) offer physics courses. Three-fifths offer 1st year physics, and two-fifths offer 2nd year physics. Most high schools (84 percent) offer coursework in coordinated/integrated science (including physical science). Fewer high schools offer courses in environmental science (66 percent) or Earth/space science (59 percent) than in the other science disciplines. Only 27 percent offer a second course in environmental science; 6 percent of schools offer 2nd year Earth/space science courses. Nearly one-half of high schools offer at least one engineering course; 31 percent offer non-college prep,

and 29 percent offer 1st year college prep engineering courses. Only 17 percent of high schools offer a 2nd year engineering course.

Table 4.4
High Schools Offering Various Science Courses

	PERCENT OF SCHOOLS
Biology/Life Science	
Any level	97 (1.7)
Non-college prep	70 (3.0)
1st year college prep, including honors	73 (3.4)
2nd year advanced	60 (3.8)
Chemistry	
Any level	94 (1.9)
Non-college prep	58 (3.0)
1st year college prep, including honors	72 (3.3)
2nd year advanced	45 (3.3)
Physics	
Any level	82 (3.0)
Non-college prep	45 (3.4)
1st year college prep, including honors	60 (3.2)
2nd year advanced	40 (2.8)
Coordinated/Integrated/Interdisciplinary Science Courses (including General Science and Physical Science)	
Any level	84 (2.3)
Non-college prep	70 (2.6)
College prep, including honors	46 (3.4)
Environmental Science/Ecology	
Any level	66 (3.2)
Non-college prep	44 (3.5)
1st year college prep, including honors	26 (2.5)
2nd year advanced	27 (2.4)
Earth/Space Science	
Any level	59 (3.5)
Non-college prep	47 (3.6)
1st year college prep, including honors	23 (2.5)
2nd year advanced	6 (1.2)
Engineering	
Any level	46 (3.2)
Non-college prep	31 (2.7)
1st year college prep, including honors	29 (2.5)
2nd year advanced	17 (2.1)

Table 4.5 shows the percentage of high schools offering each of the Advanced Placement (AP) science courses and the percentage of grades 9–12 students in the nation at those schools. Biology is the most commonly offered AP course, available in about 4 in 10 high schools. About the same proportion offer some form of AP Physics, with AP Physics 1 being the most common type. AP Chemistry is offered in roughly 1 in 3 schools and AP Environmental Science in about 1 in 4 high schools. That the percentage of high school students with access to each

course is much larger than the percentage of schools offering it indicates that larger schools are more likely than smaller schools to offer AP science courses. However, 27–80 percent of students do not have access to the various AP science courses.

Table 4.5
Access to AP Science Courses, by Schools and Students

	PERCENT OF HIGH SCHOOLS OFFERING	PERCENT OF HIGH SCHOOL STUDENTS WITH ACCESS
AP Biology	**43 (3.1)**	**73 (2.4)**
AP Physics (any course)	**41 (3.2)**	**63 (2.6)**
AP Physics 1	31 (2.9)	56 (2.6)
AP Physics 2	13 (1.7)	26 (2.8)
AP Physics C: Mechanics	12 (1.5)	24 (2.3)
AP Physics C: Electricity and Magnetism	8 (1.2)	20 (2.3)
AP Chemistry	**36 (2.8)**	**65 (2.4)**
AP Environmental Science	**23 (2.4)**	**48 (2.6)**

Across the disciplines, 51 percent of high schools offer at least one AP science course, either this year or in alternating years (see Table 4.6). Approximately the same percentage of schools offer 1–5 AP science courses, with about 10 percent of schools in each category. Only 3 percent of schools offer all of the currently available AP science courses.

Table 4.6
Number of AP Science Courses Offered at High Schools

	PERCENT OF SCHOOLS
0 courses	49 (3.7)
1 course	10 (2.1)
2 courses	9 (1.4)
3 courses	10 (1.6)
4 courses	9 (1.3)
5 courses	8 (1.2)
6 courses	2 (0.5)
7 courses	3 (0.7)

Table 4.7 shows the average number of AP science courses offered by various equity factors. Not surprisingly, small schools tend to offer fewer AP science courses than large schools. On average, suburban and urban schools offer more AP science courses than rural schools. In addition, schools in the top two quartiles in terms of the percentage of students eligible for free/ reduced-price lunch offer fewer AP science courses than schools with lower proportions of such students.

Table 4.7
Equity Analyses of Number of AP Science Courses Offered at High Schools

	AVERAGE NUMBER OF COURSES
Percent of Students in School Eligible for FRL	
Lowest Quartile	2.0 (0.3)
Second Quartile	2.2 (0.3)
Third Quartile	1.1 (0.2)
Highest Quartile	1.4 (0.2)
School Size	
Smallest Schools	0.5 (0.2)
Second Group	1.0 (0.2)
Third Group	1.7 (0.2)
Largest Schools	3.2 (0.2)
Community Type	
Rural	0.9 (0.1)
Suburban	2.3 (0.2)
Urban	1.9 (0.3)

The survey also asked if high schools offer International Baccalaureate (IB) courses. As can be seen in Table 4.8, very few schools offer the IB program and fewer than 1 in 10 high school students have access to any of these science courses.

Table 4.8
Access to IB Science Courses, by Schools and Students

	PERCENT OF HIGH SCHOOLS OFFERING	PERCENT OF HIGH SCHOOL STUDENTS WITH ACCESS
IB Biology	3 (0.7)	8 (1.6)
IB Chemistry	2 (0.5)	6 (1.2)
IB Physics	2 (0.6)	5 (1.4)
IB Environmental Systems and Societies	2 (0.5)	4 (1.1)

The survey asked high schools about opportunities provided to students to take science and engineering courses not offered on-site. As previously described, 82 percent of high schools offer at least one physics course; a small additional percentage of schools provide students with access to physics either by offering it in alternative years or by allowing students to take the course off campus (see Table 4.9). Over half of high schools have students take science and/or engineering courses at a college/university, and almost half provide access to concurrent credit/ dual enrollment courses—courses that count for high school and college credit. About 2 in 5 high schools allow students to take science and/or engineering courses at a Career and Technical Education center or virtually through other schools/institutions. Fewer than 1 in 5 high schools have students take science/engineering courses at another high school or provide their own science and/or engineering courses virtually.

Table 4.9
Science Programs and Practices Currently Being Implemented in High Schools

	PERCENT OF SCHOOLS
Physics courses are offered this school year or in alternating years, on or off site.	87 (2.8)
Students can go to a college or university for science and/or engineering courses.	54 (3.0)
Concurrent college and high school credit/dual enrollment courses are offered this school year or in alternating years.	46 (3.2)
Students can go to a Career and Technical Education center for science and/or engineering instruction.	41 (2.3)
This school provides students access to virtual science and/or engineering courses offered by other schools/ institutions.	41 (3.4)
Students can go to another K–12 school for science and/or engineering courses.	17 (2.1)
This school provides its own science and/or engineering courses virtually.	15 (2.1)

In mathematics, middle schools were asked how many 8th grade students would complete Algebra 1 and Geometry prior to 9th grade. As can be seen in Table 4.10, about three-fourths of middle schools have some students completing Algebra 1, and about one-fourth have students completing Geometry. Approximately a quarter of middle schools have 51 percent or more of their students completing Algebra 1; in schools that offer Geometry, only a small percentage of students typically complete the course prior to 9th grade.

Table 4.10
Middle Schools With Various Percentages of 8th Graders Completing Algebra 1 and Geometry Prior to 9th Grade

	PERCENT OF SCHOOLS	
	ALGEBRA 1	GEOMETRY
0 percent of students	26 (3.9)	74 (3.1)
1–10 percent of students	6 (1.4)	13 (1.5)
11–20 percent of students	12 (1.8)	4 (1.5)
21–30 percent of students	13 (1.9)	2 (0.5)
31–40 percent of students	11 (1.6)	0 (0.2)
41–50 percent of students	8 (2.0)	1 (0.5)
51–60 percent of students	5 (1.9)	0 (0.1)
61–70 percent of students	4 (1.6)	1 (0.9)
71–80 percent of students	2 (1.1)	1 (0.5)
81–90 percent of students	3 (1.1)	1 (0.6)
Over 90 percent of students	11 (2.7)	4 (2.2)

The data also show that students in high-poverty schools are less likely than students in low-poverty schools to complete either of these courses prior to 9th grade (see Table 4.11). In addition, a smaller proportion of students in rural middle schools complete Algebra 1 than in suburban and urban middle schools, and a smaller proportion of students in rural and urban middle schools complete Geometry than in suburban middle schools.

Table 4.11
Equity Analyses of Average Percentage of 8th Graders Completing Algebra 1 and Geometry Prior to 9th Grade

	PERCENT OF STUDENTS	
	ALGEBRA 1	GEOMETRY
Percent of Students in School Eligible for FRL		
Lowest Quartile	48 (5.1)	17 (5.5)
Second Quartile	25 (4.1)	2 (0.8)
Third Quartile	20 (4.2)	2 (0.9)
Highest Quartile	29 (6.1)	7 (5.9)
Community Type		
Rural	19 (3.5)	1 (0.3)
Suburban	43 (3.7)	16 (5.3)
Urban	32 (4.9)	3 (1.0)

Table 4.12 shows mathematics courses offered at the high school level. Nearly all high schools offer a 1st year formal/college prep mathematics course such as Algebra 1 or Integrated Math 1. The vast majority of high schools also offer a second, third, and fourth year of formal mathematics. Almost three-fourths of high schools offer mathematics courses that might qualify for college credit such as AP Calculus or AP Statistics.

Table 4.12
High Schools Offering Various Mathematics Courses

	PERCENT OF SCHOOLS
Non-college prep (e.g., Remedial Math, General Math, Consumer Math)	79 (2.8)
Formal/College prep level 1 (e.g., Algebra 1, Integrated Math 1)	98 (1.0)
Formal/College prep level 2 (e.g., Geometry, Integrated Math 2)	93 (1.9)
Formal/College prep level 3 (e.g., Algebra 2, Algebra and Trigonometry)	91 (2.2)
Formal/College prep level 4 (e.g., Pre-Calculus, Algebra 3)	90 (2.5)
Courses that might qualify for college credit (e.g., AP Calculus, AP Statistics)	72 (3.5)

Almost all high schools (98 percent) offer single-discipline mathematics courses, with 80 percent offering only these types of courses (see Table 4.13). Close to 1 in 5 high schools also offer coordinated or integrated mathematics courses; only 2 percent of high schools offer coordinated or integrated mathematics courses exclusively.

Table 4.13
Type of High School Mathematics Courses Offered

	PERCENT OF SCHOOLS
Single-subject mathematics courses only	80 (2.2)
Integrated mathematics courses only	2 (0.7)
Both	18 (2.1)

As can be seen in Table 4.14, just over half of high schools offer AP Calculus, typically AP Calculus AB. AP Calculus BC and AP Statistics are each offered by about one-third of high schools. As was the case in science, the percentage of grades 9–12 students with access to each

course is substantially greater than the percentage of schools offering it, indicating that AP mathematics courses are more likely to be offered in larger schools.

Table 4.14
Access to AP Mathematics Courses, by Schools and Students

	PERCENT OF HIGH SCHOOLS OFFERING	PERCENT OF HIGH SCHOOL STUDENTS WITH ACCESS
AP Calculus	**53 (3.2)**	**82 (1.6)**
AP Calculus AB	53 (3.2)	81 (1.7)
AP Calculus BC	30 (2.4)	56 (2.5)
AP Statistics	**34 (2.8)**	**63 (2.4)**

Although 46 percent of high schools do not offer any AP mathematics courses, 24 percent offer all three AP mathematics courses currently available (see Table 4.15). Fourteen percent of high schools offer one AP mathematics course, and 16 percent offer two different AP mathematics courses.

Table 4.15
Number of AP Mathematics Courses Offered at High Schools

	PERCENT OF SCHOOLS
0 courses	46 (3.3)
1 course	14 (2.2)
2 courses	16 (2.4)
3 courses	24 (2.2)

The data on the number of AP mathematics courses offered by various equity factors follow the same pattern as in science. As can be seen in Table 4.16, small schools tend to offer fewer AP mathematics courses than large schools, and suburban and urban schools offer more AP mathematics courses than rural schools. High-poverty schools offer fewer AP mathematics courses on average than low-poverty schools.

Table 4.16
Equity Analyses of Number of AP Mathematics Courses Offered at High Schools

	AVERAGE NUMBER OF COURSES
Percent of Students in School Eligible for FRL	
Lowest Quartile	1.3 (0.2)
Second Quartile	1.6 (0.2)
Third Quartile	0.9 (0.1)
Highest Quartile	0.8 (0.1)
School Size	
Smallest Schools	0.3 (0.1)
Second Group	0.9 (0.2)
Third Group	1.4 (0.1)
Largest Schools	2.0 (0.1)
Community Type	
Rural	0.6 (0.1)
Suburban	1.5 (0.1)
Urban	1.5 (0.2)

The survey also asked if high schools offer IB mathematics courses. As schools tend to offer IB courses in all disciplines or not at all, it is not surprising that the data for mathematics (see Table 4.17) mirror those for science.

Table 4.17
Access to IB Mathematics Courses, by Schools and Students

	PERCENT OF HIGH SCHOOLS OFFERING	PERCENT OF HIGH SCHOOL STUDENTS WITH ACCESS
IB Mathematical Studies Standard Level	3 (0.7)	8 (1.5)
IB Mathematics Standard Level	3 (0.6)	8 (1.5)
IB Mathematics Higher Level	3 (0.6)	7 (1.5)
IB Further Mathematics Standard Level	1 (0.2)	2 (0.7)

The mathematics program questionnaire also asked about a number of specific course-taking opportunities provided to students. As can be seen in Table 4.18, 76 percent of high schools offer some form of calculus course, including AP and non-AP courses, and 52 percent offer some form of probability and/or statistics course. More than 2 in 5 high schools offer Algebra 1 as a two-course sequence (e.g., Algebra A and Algebra B). Students going to a college or university for courses, earning college credit through dual enrollment, or taking virtual courses are more common practices in mathematics (59–68 percent of high schools) than in science (41–54 percent of high schools).

Table 4.18
Mathematics Programs and Practices Currently Being Implemented in High Schools

	PERCENT OF SCHOOLS
Calculus courses (beyond pre-calculus) are offered this school year or in alternating years, on or off site.	76 (3.8)
Students can go to a college or university for mathematics courses.	68 (3.1)
Concurrent college and high school credit/dual enrollment courses are offered this school year or in alternating years.	67 (3.0)
This school provides students access to virtual mathematics courses offered by other schools/institutions.	59 (3.2)
Probability and/or statistics course are offered.	52 (3.2)
Algebra 1 course, or its equivalent, is offered over two years or as two separate block courses (e.g., Algebra A and Algebra B).	44 (3.0)
Students can go to a Career and Technical Education center for mathematics instruction.	23 (2.3)
This school provides its own mathematics courses virtually.	15 (2.5)
Students can go to another K–12 school for mathematics courses.	11 (1.7)

Computer science instruction is offered at only some schools, unlike science and mathematics (see Table 4.19). About 1 in 4 elementary schools and 1 in 3 middle schools offer computer programming instruction as part of the regular school day. About half of high schools offer one or more computer courses. In high schools, the proportion of students with access to computer science instruction is higher than the proportion of schools offering it, indicating that larger high schools are more likely to offer computer science courses.

Table 4.19
Access to Computer Science Instruction, by Schools and Students

	PERCENT OF SCHOOLS OFFERING	PERCENT OF STUDENTS WITH ACCESS
Elementary	26 (3.2)	26 (3.1)
Middle	38 (3.2)	44 (3.2)
High	53 (2.9)	70 (1.9)

Table 4.20 shows the percentage of schools that offer computer science instruction by equity factors. Unsurprisingly, high-poverty schools are less likely to offer computer science than low-poverty schools, and larger schools are more likely to offer computer science than smaller schools. There are also regional differences, with schools in the West more likely to offer computer science than schools in the Midwest and South, and schools in the Northeast more likely to offer it than schools in the South.

Table 4.20
Equity Analyses of Schools Offering Computer Science Instruction

	PERCENT OF SCHOOLS
Percent of Students in School Eligible for FRL	
Lowest Quartile	44 (3.9)
Second Quartile	38 (3.8)
Third Quartile	26 (3.4)
Highest Quartile	26 (3.5)
School Size	
Smallest Schools	23 (4.6)
Second Group	33 (3.7)
Third Group	34 (3.0)
Largest Schools	43 (3.1)
Region	
Midwest	30 (3.8)
Northeast	43 (5.2)
South	24 (2.2)
West	44 (4.9)

The percentages of schools offering different types of computer science and computer technology courses are shown in Table 4.21. Almost half of high schools offer computer technology courses that do not include programming. Introductory high school computer science courses and computer science courses that might qualify for college credit are each offered at about a third of high schools. Specialized computer science courses that require programming are offered at only about 1 in 5 high schools.

Table 4.21
High Schools Offering Various Computer Science and Technology Courses

	PERCENT OF SCHOOLS
Computer technology courses that do not include programming (e.g., Computer Literacy, Keyboarding, Computer Applications, Web Design)	47 (2.4)
Introductory high school computer science courses that include programming but do not qualify for college credit (e.g., Computer Science Discoveries, Computer Science Essentials)	36 (2.4)
Specialized/elective computer science courses with programming as a prerequisite that do not qualify for college credit (e.g., game or mobile app development, robotics)	21 (1.7)
Courses that might qualify for college credit (e.g., AP Computer Science A)	35 (2.1)

As can be seen in Table 4.22, AP Computer Science A and AP Computer Science Principles are offered in about 1 in 6 high schools. Similar to science and mathematics, the percentage of grades 9–12 students with access to each course is substantially greater than the percentage of schools offering it.

Table 4.22
Access to AP Computer Science Courses, by Schools and Students

	PERCENT OF HIGH SCHOOLS OFFERING	PERCENT OF HIGH SCHOOL STUDENTS WITH ACCESS
AP Computer Science A	16 (1.4)	34 (2.3)
AP Computer Science Principles	14 (1.5)	28 (2.2)

Almost four-fifths of high schools do not offer any AP computer science course (see Table 4.23). Twelve percent offer one AP computer science course, and 9 percent offer both AP courses.

Table 4.23
Number of AP Computer Science Courses Offered at High Schools

	PERCENT OF SCHOOLS
0 courses	79 (1.6)
1 course	12 (1.4)
2 courses	9 (1.1)

Patterns in the number of AP computer science courses offered by equity factors are similar to those in science and mathematics. Large schools are more likely to offer AP computer science courses than small schools. Rural schools are less likely than suburban or urban schools, and high-poverty schools less likely than low-poverty schools, to offer AP computer science (see Table 4.24).

Table 4.24
Equity Analyses of Number of AP Computer Science Courses Offered at High Schools

	AVERAGE NUMBER OF COURSES
Percent of Students in School Eligible for FRL	
Lowest Quartile	0.5 (0.1)
Second Quartile	0.3 (0.1)
Third Quartile	0.2 (0.1)
Highest Quartile	0.2 (0.1)
School Size	
Smallest Schools	0.1 (0.1)
Second Group	0.2 (0.0)
Third Group	0.3 (0.0)
Largest Schools	0.6 (0.1)
Community Type	
Rural	0.1 (0.0)
Suburban	0.4 (0.0)
Urban	0.4 (0.1)

Students can take computer science courses from a teacher in their school at about half of high schools (see Table 4.25). Fewer high schools offer virtual computer science courses (35 percent of high schools) than virtual mathematics courses (59 percent of high schools), and students earning college credit through dual enrollment or by going to a college or university are less common practices in computer science (19 and 30 percent of high schools, respectively) than in science or mathematics (46–68 percent of high schools).

Table 4.25
Computer Science Course-Offering Practices Currently Being Implemented in High Schools

	PERCENT OF SCHOOLS
From a teacher in this school	52 (2.7)
Through virtual courses offered by other schools/institutions (e.g., online, videoconference)	35 (2.6)
By going to a college or university	30 (2.4)
By going to a Career and Technical Education (CTE) center	24 (2.5)
Concurrent college and high school credit/dual enrollment courses	19 (1.9)
By going to another high school	9 (1.8)

In addition to gathering school-level information about course offerings, the survey asked each teacher for the course type of a randomly selected class, which allows for an estimate of the percentage of courses of each type in schools. As can be seen in Table 4.26, 1st year college prep biology accounts for 22 percent of high school science classes; 16 percent of the classes are 1st year chemistry, and 8 percent are 1st year physics.

Table 4.26
Most Commonly Offered High School Science Courses

	PERCENT OF CLASSES
Biology/Life Science	
Non-college prep	7 (0.9)
1st year college prep, including honors	22 (1.4)
2nd year advanced	8 (1.3)
Chemistry	
Non-college prep	3 (0.5)
1st year college prep, including honors	16 (1.1)
2nd year advanced	3 (0.5)
Physics	
Non-college prep	2 (0.4)
1st year college prep, including honors	8 (0.8)
2nd year advanced	2 (0.4)
Earth/Space Science	
Non-college prep	3 (0.8)
1st year college prep, including honors	2 (0.5)
2nd year advanced	0 (0.2)
Environmental Science/Ecology	
Non-college prep	3 (0.6)
1st year college prep, including honors	2 (0.6)
2nd year advanced	2 (0.4)
Multi-Discipline Science Courses (e.g., General Science, Integrated Science, Physical Science)	
Non-college prep	8 (0.8)
1st year college prep, including honors	5 (0.8)
2nd year advanced	1 (0.4)

In mathematics, formal/college prep levels 1, 2, and 3 courses each account for 20 percent or more of grades 9–12 mathematics classes (see Table 4.27). Formal level 4 courses make up 14

percent of the classes, non-college prep mathematics 13 percent, and courses that might qualify for college credit account for 10 percent of classes.

Table 4.27
Most Commonly Offered High School Mathematics Courses

	PERCENT OF CLASSES
Non-college prep (e.g., Remedial Math, General Math, Consumer Math)	13 (1.2)
Formal/College prep level 1 (e.g., Algebra 1, Integrated/Unified Math I)	20 (1.1)
Formal/College prep level 2 (e.g., Geometry, Integrated/Unified Math II)	21 (1.4)
Formal/College prep level 3 (e.g., Algebra 2, Algebra and Trigonometry)	23 (1.3)
Formal/College prep level 4 (e.g., Pre-Calculus, Algebra 3)	14 (1.0)
Courses that might qualify for college credit (e.g., AP Calculus, AP Statistics)	10 (0.8)

In computer science, introductory courses account for almost half of all computer science courses that include programming or have programming as a prerequisite (see Table 4.28). Just over a third of classes might qualify for college credit; only 16 percent of classes are specialized or elective computer science courses.

Table 4.28
Most Commonly Offered High School Computer Science Courses

	PERCENT OF CLASSES
Introductory high school computer science courses that include programming (e.g., Computer Science Discoveries, Computer Science Essentials)	48 (4.0)
Specialized/elective computer science courses with programming as a prerequisite (e.g., Robotics, Game or Mobile App Development)	16 (2.8)
Courses that might qualify for college credit (e.g., AP Computer Science A)	36 (4.2)

Other Characteristics of Science, Mathematics, and Computer Science Classes

The 2018 NSSME+ found that the average size of science and mathematics classes is generally around 21–24 students (see Table 4.29), whereas high school computer science classes tend to have around 17 students. Table 4.30 shows average class size in different high school courses. As can be seen in Figure 4.1, however, these averages can obscure a wide variation in class sizes. For example, 15 percent of high school science and mathematics classes have 30 or more students.

Table 4.29
Average Class Size, by Grade Range

	AVERAGE NUMBER OF STUDENTS		
	ELEMENTARY	MIDDLE	HIGH
Science	21.6 (0.2)	23.4 (0.4)	20.9 (0.3)
Mathematics	21.0 (0.2)	21.7 (0.4)	20.5 (0.3)
Computer Science	n/a	n/a	17.0 (0.8)

Table 4.30
Average High School Class Size

	AVERAGE NUMBER OF STUDENTS
Science Courses	
Non-college prep	20.5 (0.7)
1st Year biology	23.0 (0.5)
1st Year chemistry	22.2 (0.6)
1st Year physics	19.2 (1.0)
Advanced science courses	18.4 (0.7)
Mathematics Courses	
Non-college prep	18.0 (0.6)
Formal/College prep level 1	21.1 (0.6)
Formal/College prep level 2	22.0 (0.5)
Formal/College prep level 3	21.9 (0.6)
Formal/College prep level 4	19.8 (0.7)
Courses that might qualify for college credit	18.1 (0.9)
Computer Science Courses	
Introductory high school computer science courses that include programming	18.0 (1.1)
Specialized/elective computer science courses with programming as a prerequisite	13.5 (1.6)
Computer science courses that might qualify for college credit	17.4 (1.2)

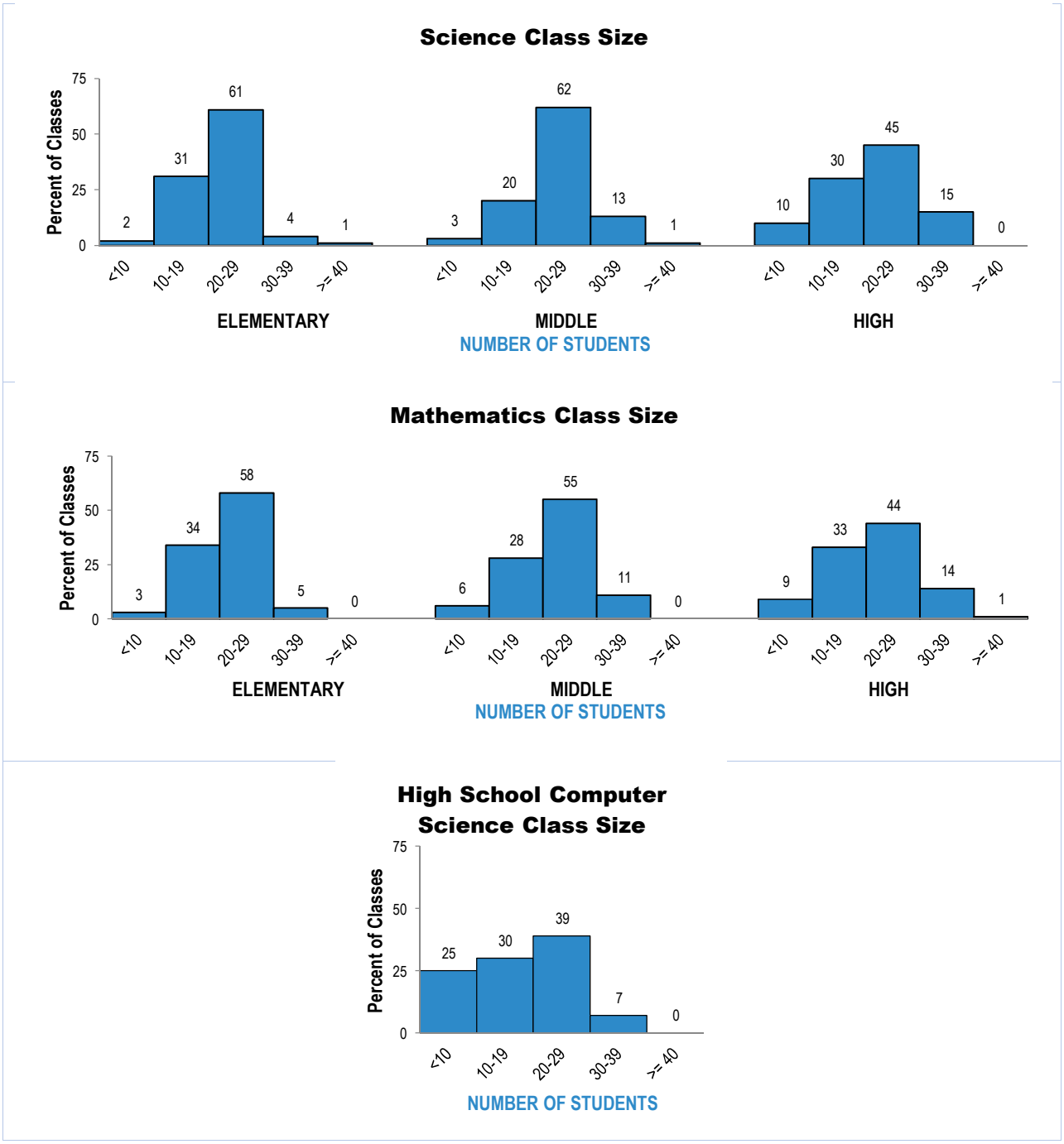

Figure 4.1

Table 4.31 shows the percentages of female students and students from race/ethnicity groups historically underrepresented in STEM in classes in the different grade bands. Elementary and middle school data mirror those of students in the nation, as students typically are required to take science and mathematics at each grade level. In high school, where students are generally not required to take each subject every year, the data show that historically underrepresented students are less likely to take science and mathematics classes. In high school computer science

classes, only about a quarter of students are female or from a historically underrepresented race/ethnicity group.

Table 4.31
Average Percentages of Female and Historically Underrepresented Students in Classes, by Grade Range

	PERCENT OF FEMALE			PERCENT OF HISTORICALLY UNDERREPRESENTED		
	ELEMENTARY	MIDDLE	HIGH	ELEMENTARY	MIDDLE	HIGH
Science	49 (0.5)	48 (0.7)	48 (0.7)	46 (1.9)	45 (1.7)	36 (1.5)
Mathematics	48 (0.7)	47 (0.7)	48 (0.9)	44 (1.7)	44 (2.0)	38 (1.6)
Computer Science	n/a	n/a	28 (2.2)	n/a	n/a	28 (2.9)

A pattern of decreasing enrollment of students from race/ethnicity groups historically underrepresented in STEM is seen in the class composition data across the progression of high school science and mathematics courses (see Table 4.32). For example, students from these groups make up 43 percent of students in non-college prep science classes and 35 percent of students in 1st year biology classes, compared to only 27 percent in advanced science classes. In mathematics, 38 percent of students in formal/college prep level 1 classes are from race/ethnicity groups historically underrepresented in STEM, compared to only 22 percent of students in classes that might qualify for college credit. In computer science, students from these groups make up 30 percent of students in introductory classes and 23 percent of students in courses that might qualify for college credit. In terms of gender, high school science and mathematics courses tend to have classes that are evenly split between male and female students on average. Exceptions are non-college prep science and mathematics classes and 1st year physics classes, which have smaller percentages of female students.

Table 4.32
Average Percentages of Female and Historically Underrepresented Students in High School Courses

	PERCENT OF STUDENTS	
	FEMALE	HISTORICALLY UNDERREPRESENTED
Science Courses		
Non-college prep	45 (1.2)	43 (2.8)
1st Year biology	51 (1.5)	35 (3.0)
1st Year chemistry	51 (1.1)	35 (2.2)
1st Year physics	41 (1.9)	30 (3.0)
Advanced science courses	54 (3.1)	27 (3.9)
Mathematics Courses		
Non-college prep	43 (1.8)	53 (4.4)
Formal/College prep level 1	47 (1.9)	38 (2.5)
Formal/College prep level 2	50 (1.2)	39 (3.2)
Formal/College prep level 3	50 (1.2)	37 (2.4)
Formal/College prep level 4	51 (1.7)	33 (2.5)
Courses that might qualify for college credit	50 (3.0)	22 (2.4)
Computer Science Courses		
Introductory high school computer science courses that include programming	30 (3.7)	30 (3.3)
Specialized/elective computer science courses with programming as a prerequisite	27 (5.7)	30 (9.2)
Computer science courses that might qualify for college credit	25 (2.5)	23 (5.8)

Teachers were asked to indicate the prior achievement level of students in the selected class relative to other students in the school. At the elementary level, 41 percent of science and 51 percent of mathematics classes are heterogeneous in terms of prior achievement; most of the remaining classes are composed primarily of average-achieving students (see Table 4.33). Heterogeneous grouping is less common in middle school mathematics and in high school science and mathematics. However, 41 percent of high school computer science classes include students with a mixture of prior achievement levels. In contrast to science and mathematics, almost no computer science classes are composed of mostly low prior achievers.

Table 4.33
Prior Achievement Grouping in Classes, by Grade Range

	PERCENT OF CLASSES		
	ELEMENTARY	MIDDLE	HIGH
Science Classes			
Mostly low achievers	11 (1.3)	17 (1.8)	13 (1.3)
Mostly average achievers	43 (1.8)	26 (1.8)	28 (1.5)
Mostly high achievers	6 (0.9)	15 (1.6)	31 (1.6)
A mixture of levels	41 (1.9)	43 (2.3)	28 (1.5)
Mathematics Classes			
Mostly low achievers	12 (1.4)	26 (1.8)	22 (1.4)
Mostly average achievers	30 (1.5)	24 (1.7)	28 (1.6)
Mostly high achievers	7 (1.0)	22 (1.8)	27 (1.3)
A mixture of levels	51 (1.8)	29 (2.0)	24 (1.6)
Computer Science Classes			
Mostly low achievers	n/a	n/a	0 (0.4)
Mostly average achievers	n/a	n/a	23 (2.8)
Mostly high achievers	n/a	n/a	36 (4.4)
A mixture of levels	n/a	n/a	41 (4.4)

The percentage of science classes composed mostly of high prior achievers tends to increase across the traditional course sequence; for example, about 30 percent of 1st year biology and chemistry classes consist mostly of high prior achievers, compared to 42 percent of 1st year physics classes and 65 percent of advanced science classes (see Table 4.34). A similar trend occurs in mathematics, where few level 1, a quarter of level 2 and level 3, half of level 4, and a large majority of classes that might qualify for college credit are composed of mostly high prior achievers. In computer science, 24 percent of introductory computer science classes, 41 percent of specialized/elective classes, and 49 percent of classes that might qualify for college credit consist of mostly high prior achievers.

Table 4.34
Prior Achievement Grouping in High School Courses

	PERCENT OF CLASSES			
	MOSTLY LOW ACHIEVERS	MOSTLY AVERAGE ACHIEVERS	MOSTLY HIGH ACHIEVERS	A MIXTURE OF LEVELS
Science Courses				
Non-college prep	26 (3.2)	34 (2.5)	12 (2.6)	28 (3.4)
1st Year biology	9 (1.8)	32 (4.1)	29 (4.2)	30 (3.5)
1st Year chemistry	5 (0.9)	32 (2.4)	32 (2.6)	31 (2.7)
1st Year physics	6 (1.7)	24 (3.2)	42 (5.0)	28 (4.5)
Advanced science courses	5 (4.8)	9 (2.2)	65 (5.4)	21 (3.0)
Mathematics Courses				
Non-college prep	56 (5.3)	19 (3.7)	8 (2.7)	17 (4.4)
Formal/College prep level 1	36 (4.3)	30 (3.2)	8 (1.9)	26 (3.8)
Formal/College prep level 2	15 (2.4)	32 (3.4)	26 (2.7)	28 (2.9)
Formal/College prep level 3	14 (2.1)	34 (3.1)	25 (3.3)	27 (3.3)
Formal/College prep level 4	6 (1.8)	28 (3.1)	47 (3.6)	19 (2.4)
Courses that might qualify for college credit	1 (0.5)	9 (2.5)	70 (3.7)	20 (3.6)
Computer Science Courses				
Introductory high school computer science courses that include programming	1 (0.8)	30 (5.1)	24 (5.6)	45 (5.8)
Specialized/elective computer science courses with programming as a prerequisite	0 ---†	13 (4.8)	41 (9.8)	46 (10.6)
Computer science courses that might qualify for college credit	0 ---†	17 (5.7)	49 (7.1)	34 (6.4)

† No high school computer science teachers in the sample selected this response option. Thus, it is not possible to calculate the standard error of this estimate.

Prior achievement grouping also varies by the percentage of students from race/ethnicity groups historically underrepresented in STEM in classes. Across all grade levels in both science (see Table 4.35) and mathematics (see Table 4.36), classes composed of 40 percent or more of students from race/ethnicity groups historically underrepresented in STEM are more likely to be classified as consisting of mostly low prior achievers than classes with smaller proportions of students from these groups. For example, 32 percent of high school mathematics classes with a high percentage of students from race/ethnicity groups historically underrepresented in STEM are classified as being composed mostly of low prior achievers, compared to 16 percent of classes with a low percentage of students from these groups. In high school computer science, classes composed of fewer than 10 percent of students from these groups are more likely to be classified as consisting of mostly high prior achievers than classes in which 40 percent or more of students are from these groups (see Table 4.37).

Table 4.35
Prior Achievement Grouping in Grades K–12 Science Classes With Low, Medium, and High Percentages of Students From Race/Ethnicity Groups Historically Underrepresented in STEM

	PERCENT OF CLASSES			
	MOSTLY LOW ACHIEVERS	MOSTLY AVERAGE ACHIEVERS	MOSTLY HIGH ACHIEVERS	A MIXTURE OF LEVELS
Elementary				
< 10% Historically underrepresented students in class	5 (1.7)	45 (3.6)	9 (2.5)	40 (3.6)
10–39% Historically underrepresented students in class	4 (1.2)	45 (2.8)	7 (1.7)	44 (3.3)
≥ 40% Historically underrepresented students in class	17 (2.3)	40 (2.7)	4 (1.2)	40 (2.8)
Middle				
< 10% Historically underrepresented students in class	4 (1.3)	28 (4.6)	22 (4.1)	47 (5.5)
10–39% Historically underrepresented students in class	10 (1.9)	27 (3.3)	19 (3.3)	44 (3.9)
≥ 40% Historically underrepresented students in class	27 (3.3)	24 (2.7)	9 (1.9)	41 (3.0)
High				
< 10% Historically underrepresented students in class	5 (1.2)	25 (3.0)	45 (3.1)	25 (2.6)
10–39% Historically underrepresented students in class	9 (1.4)	28 (2.4)	35 (2.4)	29 (2.9)
≥ 40% Historically underrepresented students in class	23 (2.8)	31 (3.4)	15 (1.9)	30 (2.6)

Table 4.36
Prior Achievement Grouping in Grades K–12 Mathematics Classes With Low, Medium, and High Percentages of Students From Race/Ethnicity Groups Historically Underrepresented in STEM

	PERCENT OF CLASSES			
	MOSTLY LOW ACHIEVERS	MOSTLY AVERAGE ACHIEVERS	MOSTLY HIGH ACHIEVERS	A MIXTURE OF LEVELS
Elementary				
< 10% Historically underrepresented students in class	5 (1.2)	32 (3.8)	10 (1.9)	54 (3.9)
10–39% Historically underrepresented students in class	5 (1.4)	35 (3.2)	8 (2.2)	52 (3.3)
≥ 40% Historically underrepresented students in class	20 (2.6)	27 (2.2)	4 (1.1)	49 (2.7)
Middle				
< 10% Historically underrepresented students in class	18 (4.1)	17 (3.1)	40 (4.7)	25 (4.0)
10–39% Historically underrepresented students in class	16 (2.9)	32 (3.8)	25 (3.1)	27 (3.6)
≥ 40% Historically underrepresented students in class	35 (3.0)	22 (2.6)	12 (2.1)	32 (2.8)
High				
< 10% Historically underrepresented students in class	16 (1.9)	27 (2.6)	39 (2.8)	18 (2.4)
10–39% Historically underrepresented students in class	16 (2.0)	28 (2.8)	31 (3.1)	25 (2.9)
≥ 40% Historically underrepresented students in class	32 (2.8)	27 (2.7)	14 (1.6)	27 (2.4)

Table 4.37
Prior Achievement Grouping in High School Computer Science Classes With Low, Medium, and High Percentages of Students From Race/Ethnicity Groups Historically Underrepresented in STEM

	PERCENT OF CLASSES			
	MOSTLY LOW ACHIEVERS	MOSTLY AVERAGE ACHIEVERS	MOSTLY HIGH ACHIEVERS	A MIXTURE OF LEVELS
High				
< 10% Historically underrepresented students in class	0 ---†	15 (3.2)	48 (6.6)	38 (5.5)
10–39% Historically underrepresented students in class	0 ---†	29 (7.9)	32 (5.9)	39 (7.7)
≥ 40% Historically underrepresented students in class	2 (1.6)	25 (7.2)	26 (9.2)	47 (10.2)

† No high school computer science teachers in the sample selected this response option. Thus, it is not possible to calculate the standard error of this estimate.

Summary

Data from the 2018 NSSME+ indicate that in the early grades, mathematics is taught much more frequently than science. Almost all elementary classes spend time on mathematics instruction every school day; in contrast, only 1 in 3 classes in grades 4–6 and 1 in 5 classes in grades K–3 receive science instruction every school day. In addition, elementary mathematics lessons tend to be substantially longer than science lessons, although the amount of time devoted to science and mathematics is substantially less than reading/language arts. Computer programming instruction is offered in only about 1 in 4 elementary schools.

In terms of the number of high schools offering various courses, virtually all schools offer at least one biology course, and nearly all offer chemistry; somewhat fewer offer physics. Environmental science and Earth/space science courses are each offered in about two-thirds of high schools. In mathematics, although most middle schools offer Algebra 1, relatively few students complete it prior to 9th grade. At the high school level, almost all schools offer the three-course sequence of Algebra 1, Geometry, and Algebra 2. Nearly as many high schools offer a fourth year in the formal mathematics sequence; three-fourths of high schools offer a calculus course, though only about half offer AP Calculus. In computer science, about half of high schools offer at least one computer science course. Students taking courses at a college or university, earning college credit through dual enrollment, or taking virtual courses are more common practices in mathematics than in science or computer science.

AP courses in science and mathematics are offered in about half of high schools. AP courses in computer science are offered in about one-fifth of high schools. These courses are less likely to be offered in schools with a high proportion of students eligible for free/reduced-price lunch and more likely to be offered in large schools. AP courses are also more common in suburban and urban schools than in rural schools.

The 2018 NSSME+ found that the percentage of classes that are heterogeneous in terms of prior achievement declines with increasing grade level. Further, students are assigned to classes that are homogeneous in regards to prior achievement disproportionally by race/ethnicity; classes with higher proportions of students from race/ethnicity groups historically underrepresented in STEM are more likely to be labeled as consisting of "mostly low prior achievers."

In science, about half of the students in high school biology, chemistry, and physics classes are female, though students in advanced science courses are more likely to be female than male. The proportion of female and male students in college preparatory mathematics classes is about equal. Students from historically underrepresented race/ethnicity groups make up about 45 percent of the enrollment in grades K–12, but at the high school level, the proportion of students from these groups decreases as the level of science and mathematics increases. Female students and students from race/ethnicity groups historically underrepresented in STEM each make up fewer than a third of the students in high school computer science classes.