



InfoBrief

University Research Space Increased by 6.1 Million Square Feet between FY 2017 and FY 2019

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Science and engineering (S&E) research space reached 227.3 million net assignable square feet (NASF) at research-performing universities and colleges in FY 2019 ([table 1](#)). This amount was 6.1 million NASF (3%) more than the FY 2017 total ([figure 1](#)), according to the biennial Survey of Science and Engineering Research Facilities, conducted by the National Center for Science and Engineering Statistics (NCSES) within the National Science Foundation (see "[Data Notes](#)" for definitions of research space and NASF).

Table 1

Science and engineering research space in academic institutions, by field and research animal space: FYs 2007–19

(Net assignable square feet in millions)

Field and research animal space	FY 2007	FY 2009	FY 2011	FY 2013	FY 2015	FY 2017	FY 2019
All research space	187.9	196.1	202.2	211.8	214.5	221.2	227.3
Agricultural sciences	27.9	29.5	27.6	30.5	28.3	29.0	28.4
Biological and biomedical sciences	44.8	50.3	53.7	57.2	55.9	57.7	58.7
Computer and information sciences	4.8	5.2	5.0	4.3	4.3	4.2	4.6
Engineering	28.4	30.2	31.7	33.4	34.2	35.2	38.1
Geosciences, atmospheric sciences, and ocean sciences	8.4	8.0	7.8	7.8	8.1	8.5	8.7
Health sciences	37.0	36.3	36.7	38.0	39.2	39.8	41.2
Mathematics and statistics	1.6	1.5	1.5	1.7	1.8	1.8	1.8
Natural resources and conservation	na	na	na	na	3.5	4.3	4.7
Physical sciences	20.3	20.5	21.8	22.9	22.7	23.2	23.4
Psychology	4.9	5.2	5.5	5.5	5.5	5.6	5.9
Social sciences	6.0	5.5	5.7	5.7	6.0	6.1	6.4
Other fields of S&E	3.7	3.9	5.2	4.8	4.9	5.8	5.3
Research animal space ^a	17.8	18.1	18.4	18.9	19.2	19.2	19.0
Medical school space ^a	43.8	44.3	47.6	48.6	48.6	47.5	49.7

na = not applicable; see notes below.

S&E = science and engineering.

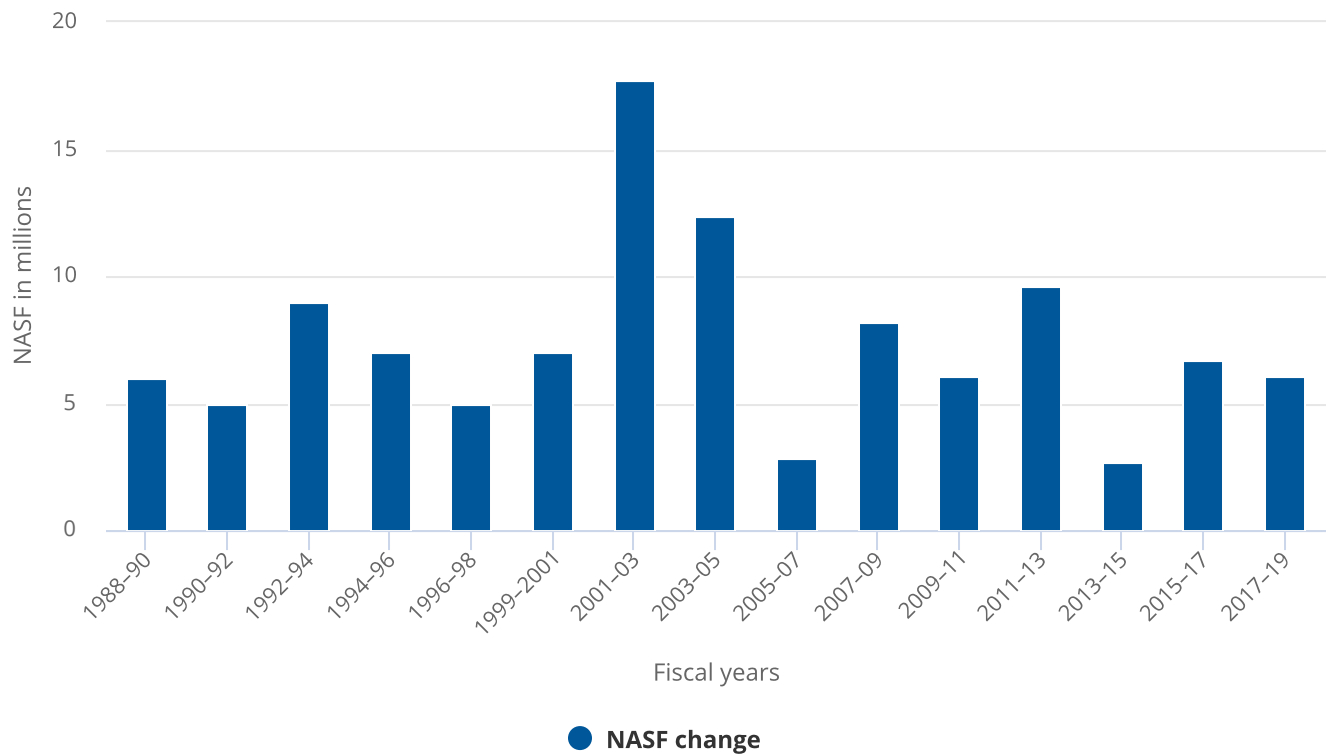
^a Research animal space and medical school space are listed separately and are also included in individual field totals.

Note(s):

Fields of science and engineering and their disciplines were revised in FY 2015. Specifically, "Agricultural sciences and natural resources sciences" was split into "Agricultural sciences" and "Natural resources and conservation." Prior to FY 2015, data for "Natural resources and conservation" are included in "Agricultural sciences." Details may not add to totals due to rounding.

Source(s):

National Center for Science and Engineering Statistics, Survey of Science and Engineering Research Facilities.

Figure 1**Science and engineering research space in academic institutions, change over 2-year period: FYs 1988–2019**

NASF = net assignable square feet.

Note(s):

The biennial survey cycle ran on even years from FYs 1988–98 and on odd years from FYs 1999–2019.

Source(s):

National Center for Science and Engineering Statistics, Survey of Science and Engineering Research Facilities.

Research space in engineering grew by 2.9 million NASF, or 8%, from FY 2017 to FY 2019, which was the largest absolute increase of any field in terms of net NASF. This was also the largest absolute increase in engineering research space since S&E field data were first collected in FY 1988. Although many universities reported growth in engineering research space, the Georgia Tech Research Institute acquired close to 1 million NASF of engineering research space, resulting in a large share of the total increase. Research space in health sciences showed the second-largest increase in NASF, adding 1.4 million (4%), while biological and biomedical sciences NASF increased by 1.0 million (2%). These were the only fields that added at least 500,000 NASF.

Overall, the five largest fields accounted for 84% of total research space. Biological and biomedical sciences accounted for the largest share of all research space in FY 2019 with 26% of the total. The next four largest fields were health sciences (18%), engineering (17%), agricultural sciences (12%), and physical sciences (10%). No other field accounted for more than 4% of total research NASF. The seven smallest fields accounted for the remaining 16% of research space and, combined, added 1.1 million NASF between FY 2017 and FY 2019.

Research space in medical schools reached 49.7 million NASF in FY 2019 and accounted for 22% of total research space at academic institutions. Medical school research space is spread across several S&E fields but is primarily devoted to biological and biomedical sciences and health sciences research. The national total increased 2.2 million NASF from FY 2017 to FY 2019 after remaining virtually unchanged from FY 2011 to FY 2017. The change is due to both increased R&D space over the period and the ability of some institutions to report medical school R&D space more accurately than was done in the past.

New Construction of Research Space

New research space is added each year through new construction projects, the repurposing of existing space, and occasional acquisitions. Similarly, some space is withdrawn from use through decommissioning and repurposing. As part of this process, academic institutions broke ground on 5.6 million NASF of new S&E research space construction projects in FYs 2018–19 (table 2), costing more than \$5.1 billion.¹ Although some of this new construction was completed within this time frame, some projects extended beyond FY 2019, so the research space was not yet in use. Projects designed for engineering (1.5 million NASF), health sciences (1.3 million NASF), and biological and biomedical sciences (1.0 million NASF) research accounted for 68% of new research space construction started in FYs 2018–19. Around 16% of the total new construction was for research space in medical schools.

Table 2

New construction of science and engineering research space in academic institutions, by field and time of construction: FYs 2010–21

(Net assignable square feet in millions)

Field	Started in FY 2010 or FY 2011	Started in FY 2012 or FY 2013	Started in FY 2014 or FY 2015	Started in FY 2016 or FY 2017	Started in FY 2018 or FY 2019	Planned to start in FY 2020 or FY 2021
All research space	8.1	6.6	5.1	6.7	5.6	10.1
Agricultural sciences	0.4	0.4	0.4	0.2	0.6	0.6
Biological and biomedical sciences	2.0	2.0	1.5	1.9	1.0	1.9
Computer and information sciences	0.1	0.2	0.1	0.3	0.2	0.6
Engineering	1.3	1.4	0.9	1.4	1.5	1.8
Geosciences, atmospheric sciences, and ocean sciences	0.3	0.2	0.2	0.1	0.1	0.3
Health sciences	2.8	1.6	1.0	1.4	1.3	3.3
Mathematics and statistics	*	*	*	*	*	0.1
Natural resources and conservation	na	na	*	0.1	*	*
Physical sciences	0.6	0.6	0.7	0.6	0.5	0.7
Psychology	0.1	*	0.1	0.1	*	0.1
Social sciences	0.1	0.1	*	0.2	*	0.3
Other fields of S&E	0.3	0.1	0.2	0.3	0.2	0.4
Medical school space ^a	2.3	1.3	0.8	0.9	0.9	2.5

* = value > 0 but < 50,000 net assignable square feet. na = not applicable; see notes below.

S&E = science and engineering.

^a Medical school space is listed separately and is also included in individual field totals.

Note(s):

Fields of science and engineering and their disciplines were revised in FY 2015. Specifically, "Agricultural sciences and natural resources sciences" was split into "Agricultural sciences" and "Natural resources and conservation." Prior to FY 2015, data for "Natural resources and conservation" are included in "Agricultural sciences." Details may not add to totals due to rounding.

Source(s):

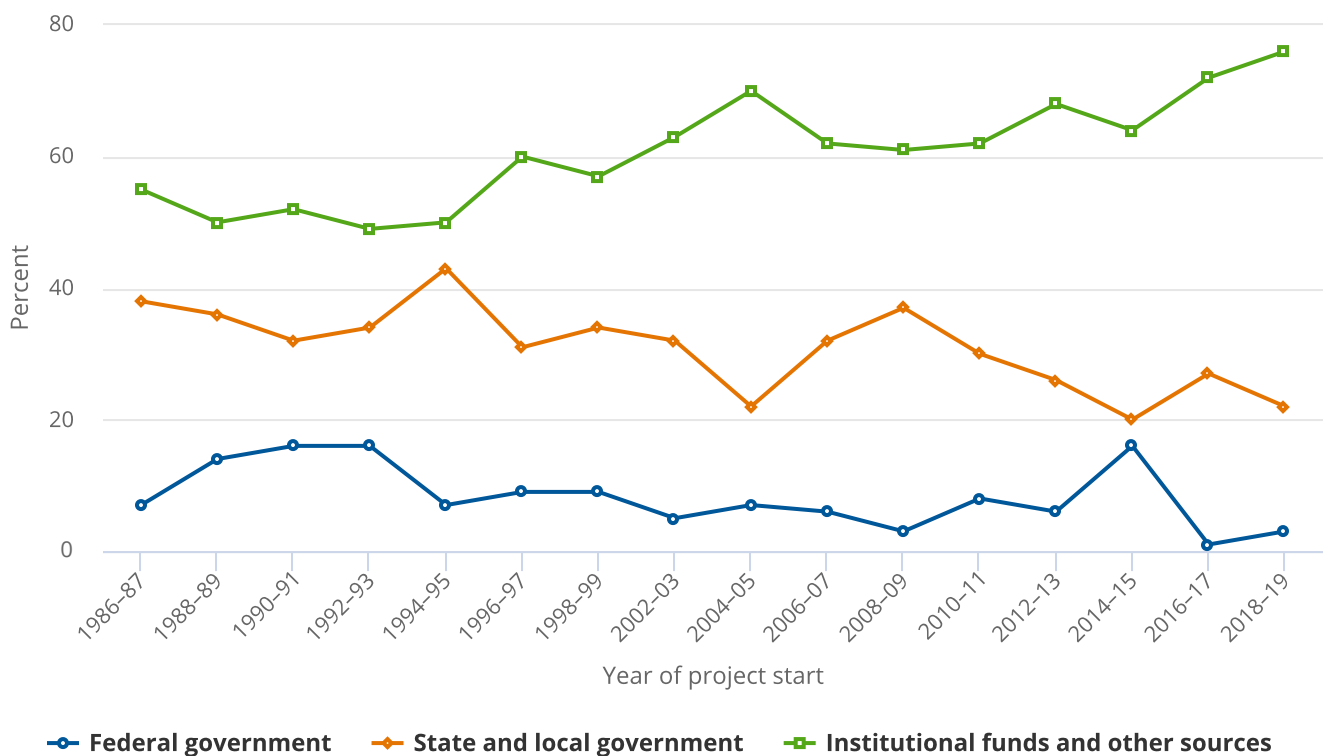
National Center for Science and Engineering Statistics, Survey of Science and Engineering Research Facilities.

U.S. universities and colleges reported that they planned to start 10.1 million NASF of new research space construction in FY 2020 or FY 2021 with projected costs of \$9.5 billion. However, because institutions' budgets and priorities may change unexpectedly, not all planned projects are started during the projected time frame. In FY 2017, academic institutions reported 9.4 million NASF of planned new research space construction for FY 2018 or FY 2019.² The actual amount reported in FY 2019 for that period was 5.6 million NASF, which was 60% of what was previously reported as planned.

Most support for new construction of research space has largely been funded from institutional funds and other sources, which include operating funds, endowments, private donations, tax-exempt bonds and other debt financing, and indirect costs recovered from federal and nonfederal sources. Over the past 2 decades, state and local governments typically funded between one-fifth and one-third of new research construction. Federal government sources generally provide a much lower proportion, often well under 10%. From FYs 1986–87 through FYs 2010–11, institutional and other funding typically ranged between 49% and 63%, except for FYs 2004–05 when this funding reached 70% (figure 2). With federal funding declining to 3% or less since FYs 2016–17, institutional and other funding for new research space construction reached an all-time high of 76% in FYs 2018–19. State and local government funding has also been at or near historical lows since FYs 2014–15.

Figure 2

Source of funds for new construction of science and engineering research space in academic institutions, by year of project start: FYs 1986–2019



Note(s):

Details may not add to totals due to rounding. Institutional funds and other sources include an institution's operating funds, endowments, private donations, tax-exempt bonds and other debt financing, and indirect costs recovered from federal and nonfederal sources. The question on construction costs was not asked for FYs 2000–01; therefore, no data are reported here. Only construction projects costing over \$250,000 for a single field were reported for FYs 2002–19; construction projects costing over \$100,000 were reported in previous cycles.

Source(s):

National Center for Science and Engineering Statistics, Survey of Science and Engineering Research Facilities.

Repair and Renovation

Academic institutions expended \$5.5 billion on major repairs and renovation of S&E research space started in FY 2018 or FY 2019 (table 3). Costs for research space improvements exceeded \$1 billion in two fields: biological and biomedical sciences (\$1.7 billion) and health sciences (\$1.4 billion). Costs for repair and renovations started in FYs 2018–19 totaled \$758 million for engineering and \$526 million for physical sciences research space. Academic institutions spent around \$200 million or more on repairs and renovation of research space started in FYs 2018–19 in geosciences, atmospheric sciences, and ocean sciences (\$237 million), social sciences (\$200 million), and agricultural sciences (\$196 million). Combined, these seven fields accounted for 92% of all research space repair and renovation costs.

Table 3

Costs for repair and renovation of science and engineering research space in academic institutions, by field and time of repair and renovation: FYs 2018–21

(Costs in millions of dollars)

Field	Started in FY 2018 or FY 2019	Planned to start in FY 2020 or FY 2021	Deferred projects	
			Included in institutional plan	Not included in institutional plan
All research space	5,483.4	5,307.2	5,981.9	4,394.7
Agricultural sciences	196.1	128.8	504.4	211.9
Biological and biomedical sciences	1,745.2	1,826.8	1,645.2	934.8
Computer and information sciences	110.6	74.9	151.2	55.3
Engineering	757.7	897.1	1,019.1	786.2
Geosciences, atmospheric sciences, and ocean sciences	237.4	175.1	247.0	240.8
Health sciences	1,376.7	876.7	690.6	548.2
Mathematics and statistics	14.7	94.3	166.1	75.5
Natural resources and conservation	73.0	66.2	108.4	99.6
Physical sciences	526.1	883.8	870.5	749.3
Psychology	139.1	160.8	321.4	270.1
Social sciences	199.5	96.7	187.0	271.3
Other fields of S&E	107.5	26.0	70.9	151.8

S&E = science and engineering.

Note(s):

Fields of science and engineering and their disciplines were revised in FY 2015. Specifically, "Agricultural sciences and natural resources sciences" was split into "Agricultural sciences" and "Natural resources and conservation." Prior to FY 2015, data for "Natural resources and conservation" are included in "Agricultural sciences." Deferred projects are those that (1) are not funded and (2) are not scheduled for FY 2020 or FY 2021. Details may not add to totals due to rounding.

Source(s):

National Center for Science and Engineering Statistics, Survey of Science and Engineering Research Facilities.

Institutions anticipate \$5.3 billion in costs for planned repairs and renovations with start dates in FY 2020 or FY 2021. They expect to spend more than \$1.8 billion improving research space in biological and biomedical sciences and another \$875 million to \$900 million on improvements in each of the engineering, physical sciences, and health sciences fields. In addition to these slated improvements, academic institutions reported \$6.0 billion in deferred repair and renovation projects included in their institutional plans, as well as \$4.4 billion not included in their institutional plans. Projects in these latter categories were not funded and not scheduled to begin before FY 2022.

Research Space at the Largest Institutions

Of the 590 institutions surveyed, the top 30 institutions ranked by total S&E research NASF accounted for 35% of all research space in FY 2019 (table 4). This is the same share for the top 30 (although not necessarily the same 30 institutions) reported in FYs 2017, 2015, and 2013. In FY 2019, the top 30 institutions in terms of total research space accounted for 54% of all research space in the agricultural sciences and 40% of space in the natural resources and conservation fields. They also reported a large percentage of total academic research space in health sciences (40%), engineering (35%), and social sciences (33%). These institutions accounted for less than 30% of the nation's research space in the six other major fields: biological and biomedical sciences (29%), mathematics and statistics (26%), physical sciences (26%), geosciences, atmospheric sciences, and ocean sciences (25%), psychology (25%), computer and information sciences (21%).³

Table 4

Thirty institutions reporting the most FY 2019 research space in all fields: FYs 2015 to 2019

(Net assignable square feet in thousands)

Institution	Rank	FY 2015	FY 2017	FY 2019
All institutions	-	214,493	221,240	227,275
Leading 30 institutions	-	74,837	76,830	79,069
U. Florida	1	4,156	4,187	4,253
U. Georgia	2	3,891	3,950	3,945
U. Minnesota, Twin Cities	3	3,400	3,791	3,763
U. Wisconsin-Madison	4	2,904	2,804	3,111
Texas A&M U., College Station and Health Science Center	5	2,926	3,041	3,101
U. California, Davis	6	3,052	3,058	3,089
U. Illinois, Urbana-Champaign	7	3,034	3,058	3,080
Ohio State U.	8	1,383	2,961	3,015
Johns Hopkins U.	9	3,548	3,267	2,978
U. California, San Diego	10	2,694	2,742	2,951
U. California, Los Angeles	11	2,806	2,824	2,918
Georgia Institute of Technology	12	1,782	1,922	2,830
Michigan State U.	13	2,446	2,790	2,814
U. Kentucky	14	2,394	2,611	2,780
North Carolina State U.	15	2,633	2,678	2,575
Yale U.	16	2,372	2,387	2,447
Pennsylvania State U., University Park and Hershey Medical Center	17	2,561	2,311	2,420
Harvard U.	18	2,420	2,410	2,416
U. California, Berkeley	19	2,551	2,484	2,408
Washington State U.	20	2,161	2,202	2,259
Wake Forest U.	21	1,326	1,455	2,248
Mississippi State U.	22	2,140	2,173	2,177
U. Washington, Seattle	23	1,935	2,002	2,135
Columbia U. in the City of New York	24	1,878	2,002	2,006
Cornell U.	25	2,218	1,967	1,994
U. Michigan, Ann Arbor	26	1,878	1,900	1,905
U. California, San Francisco	27	2,024	1,895	1,898
U. Pennsylvania	28	1,723	1,764	1,861
U. Maryland ^a	29	na	na	1,858
Rutgers, State U. New Jersey, New Brunswick	30	1,772	1,921	1,833

i = imputed. na = not applicable; see notes below.

^a The University of Maryland includes the University of Maryland Baltimore and University of Maryland College Park campuses. In FY 2019, the two campuses began reporting as one research unit to reflect their new strategic partnership. This relationship was codified through the University of Maryland Strategic Partnership Act passed by the Maryland General Assembly in 2016. Prior to FY 2019, both campuses reported separately and were included in publications as separate institutions.

Note(s):

Totals for the leading 30 institutions reflect the institutions in the top 30 for that given year. Some institutions in the FY 2017 ranking were not in the top 30 prior in FY 2015. Some institutions in the FY 2019 ranking were not in the top 30 prior to FY 2019. Details may not add to totals due to rounding.

Source(s):

National Center for Science and Engineering Statistics, Survey of Science and Engineering Research Facilities.

Data Notes

Data Sources and Availability

The data presented in this InfoBrief were obtained from the Survey of Science and Engineering Research Facilities, conducted by NCSES within the National Science Foundation. The survey is a census of 590 colleges and universities that expended at least \$1 million in S&E research and development funds in FY 2018. The response rate for this survey was 97%. For more details see the survey description at <https://www.nsf.gov/statistics/srvyfacilities/#sd>.

The full set of data tables and technical notes will be available in *Science and Engineering Research Facilities: Fiscal Year 2019* at <https://www.nsf.gov/statistics/srvyfacilities/#tabs-2>. Data for the survey are also available in NCSES's interactive data tool (<https://ncesdata.nsf.gov/home/>). Please contact the author for more information.

Definitions

Net assignable square feet (NASF) is the sum of all areas on all floors of a building assigned to, or available to be assigned to, an occupant for a specific use, such as research or instruction. NASF is measured from the inside faces of walls.

Research space is the NASF of space in buildings within which research activities take place. Research facilities are located within buildings. A building is a roofed structure for permanent or temporary shelter of persons, animals, plants, materials, or equipment. Structures should be included if they are (1) attached to a foundation, (2) roofed, (3) serviced by a utility, exclusive of lighting, and (4) a source of significant maintenance and repair activities.

Notes

- 1 Data on costs for new construction of S&E research space will be available in data tables 12 through 17 (<https://www.nsf.gov/statistics/srvyfacilities/#tabs-2>).
- 2 NCSES InfoBrief *University Research Space Increased by 5.5 Million Square Feet between FY 2015 and FY 2017* (<https://www.nsf.gov/statistics/2019/nsf19313/>), and data table 8 in *Science and Engineering Research Facilities: Fiscal Year 2017* (<https://ncesdata.nsf.gov/datatables/facilities/2017/>).
- 3 Data on institutional rankings by field will be available in data table 3 (<https://www.nsf.gov/statistics/srvyfacilities/#tabs-2>).

Suggested Citation

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