

## Research Space at Academic Institutions Increased 1.4% between FY 2013 and FY 2015: Smallest Growth in Three Decades

by Michael T. Gibbons<sup>1</sup>

**R**esearch-performing universities and colleges increased their science and engineering (S&E) research space 1.4% from FY 2013 to FY 2015, according to the biennial Survey of Science and Engineering Research Facilities. This was the lowest 2-year percentage

increase since data collection began in 1988. Total research space increased 2.9 million net assignable square feet (NASF) over this period, from 211.8 million to 214.7 million (table 1) (see “Data Notes” for definitions). The rate of increase was substantially below the

average 2-year growth rate (4.9%), as measured from FY 1988 to FY 2015 (figure 1).

Biological and biomedical sciences totaled 1.3 million fewer NASF of research space in FY 2015 than in FY

TABLE 1. Science and engineering research space in academic institutions, by field and research animal space: FYs 2007–15 (Net assignable square feet in millions)

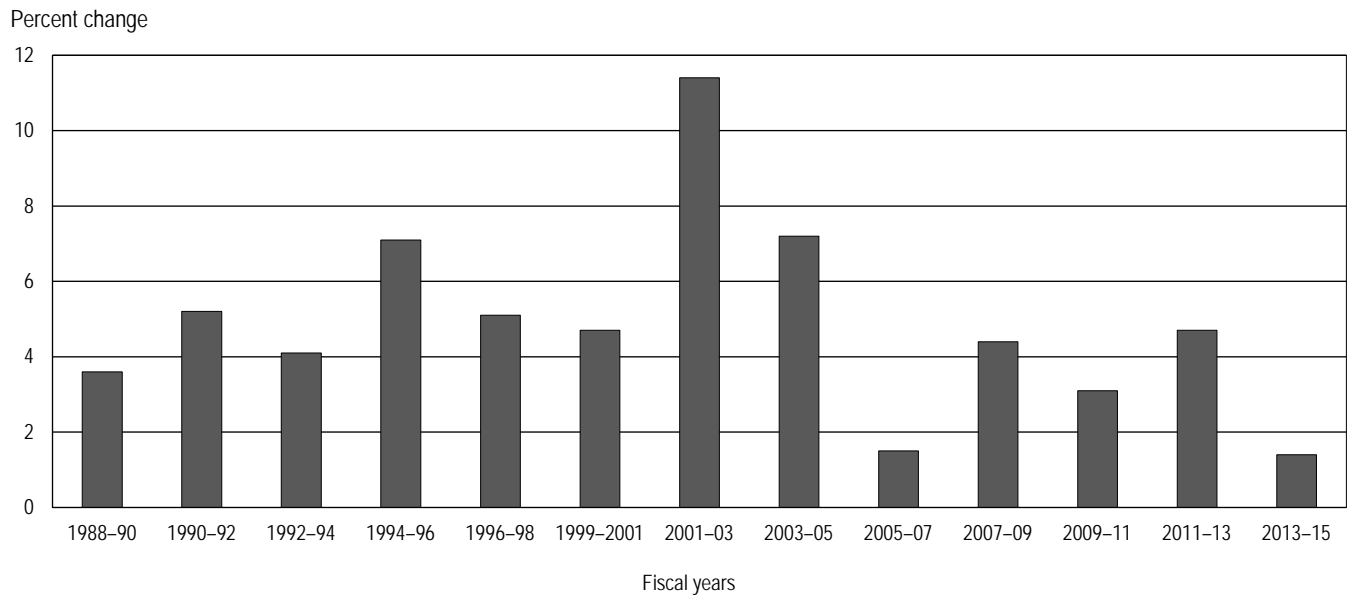
Field and research animal space	FY 2007	FY 2009	FY 2011	FY 2013	FY 2015
All research space	187.9	196.1	202.2	211.8	214.7
Agricultural sciences	27.9	29.5	27.6	30.5	28.1
Biological and biomedical sciences	44.8	50.3	53.7	57.2	55.9
Computer and information sciences	4.8	5.2	5.0	4.3	4.6
Engineering	28.4	30.2	31.7	33.5	34.3
Geosciences, atmospheric, and ocean sciences	8.4	8.0	7.8	7.8	8.1
Health sciences	37.0	36.3	36.7	38.0	39.2
Mathematics and statistics	1.6	1.5	1.5	1.7	1.8
Natural resources and conservation	na	na	na	na	3.5
Physical sciences	20.3	20.5	21.8	22.9	22.7
Psychology	4.9	5.2	5.5	5.5	5.5
Social sciences	6.0	5.5	5.7	5.7	6.0
Other	3.7	3.9	5.2	4.8	4.9
Research animal space	17.8	18.1	18.4	18.9	19.4

na = not applicable; see notes below.

NOTES: Fields of science and engineering and their disciplines were revised in FY 2015. Specifically, “Agricultural sciences and natural resources sciences” has been split into “Agricultural sciences” and “Natural resources and conservation.” “Earth, atmospheric, and ocean sciences” and “Astronomy, chemistry, and physics” were relabeled “Geosciences, atmospheric, and ocean sciences” and “Physical sciences,” respectively. Data were not collected separately for “Natural resources and conservation” prior to the FY 2015 survey and are included in the “Agricultural sciences” field for earlier cycles. Details may not add to totals due to rounding. Research animal space is listed separately and is also included in individual field totals.

SOURCE: National Science Foundation, 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 1988–2015



NOTES: Space measured in net assignable square feet. The biennial survey cycle ran on even years from FYs 1988–98 and on odd years from FYs 1999–2015.

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

2013, a 2.3% decrease (table 1). This broke a pattern of growth that averaged 8.5% biennially from 2007 to 2013 and increased total research space in the field by 12.4 million NASF.<sup>2</sup> Biological and biomedical sciences still account for the largest share of academic research space with 26%, or 55.9 million NASF.

Of the other larger fields, research space in the health sciences gained 3.2% from FY 2013 to FY 2015 and engineering programs added 2.4% NASF. Research space in the physical sciences declined less than 1%, from 22.9 million NASF to 22.7 million NASF. The agricultural sciences were reported separately from the natural resources and conservation fields for the FY 2015 survey. When the two fields were grouped together, the 2-year growth rate was 3.6%.

On its own, the 28.1 million NASF in agricultural sciences comprised

the fourth largest share (13%) of total S&E research space, behind biological and biomedical sciences (26%), health sciences (18%), and engineering (16%). This is slightly greater than the fifth major field, physical sciences, which accounted for 11% of academic research space. Research space in the smaller S&E fields increased by almost 4% from FY 2013 to FY 2015, with no single field showing a net loss of space. Engineering is the only major field where total research space increased at academic institutions during each biennial cycle from 2007 to 2015.

### New Construction of Research Space

New research space is added each year through new construction projects and the repurposing of existing space. In addition, some space is withdrawn from use through decommissioning and repurposing. The net result has been an increase in research space for more than 2 decades. As part of this

process, academic institutions broke ground on 5.2 million NASF of new S&E research space construction projects in FYs 2014–15, which was 21.2% less than construction space started in FYs 2012–13 (6.6 million NASF). This continued a trend dating to FYs 2002–03, where smaller amounts of new research space construction have been reported successively for five of the past six survey cycles (table 2). Construction projects for biological and biomedical sciences (1.5 million NASF), engineering (1.0 million NASF), and health sciences (1.0 million NASF) accounted for two-thirds of new research space construction started in FYs 2014–15.

The 9.6 million NASF of planned new research space construction anticipated to begin in FY 2016 or FY 2017 is the greatest total since 10.3 million NASF was planned for FYs 2010 and 2011 (the actual amount of new construction started in FYs 2010 and 2011 was 8.1

TABLE 2. New construction of science and engineering research space in academic institutions, by field and time of construction: FYs 2006–17 (Net assignable square feet in millions)

Field	Started in FY 2006 or FY 2007	Started in FY 2008 or FY 2009	Started in FY 2010 or FY 2011	Started in FY 2012 or FY 2013	Started in FY 2014 or FY 2015	Planned to start in FY 2016 or FY 2017
All research space	8.8	9.9	8.1	6.6	5.2	9.6
Agricultural sciences	0.5	0.4	0.4	0.4	0.4	0.5
Biological and biomedical sciences	2.9	3.5	2.0	2.0	1.5	2.3
Computer and information sciences	0.6	0.3	0.1	0.2	0.1	0.2
Engineering	1.3	2.1	1.3	1.4	1.0	1.5
Geosciences, atmospheric, and ocean sciences	0.3	0.1	0.3	0.2	0.2	0.4
Health sciences	1.7	1.9	2.8	1.6	1.0	2.6
Mathematics and statistics	*	*	*	*	*	*
Natural resources and conservation	na	na	na	na	*	*
Physical sciences	0.7	0.9	0.6	0.6	0.7	1.0
Psychology	0.1	0.3	0.1	*	0.1	0.1
Social sciences	0.1	0.2	0.1	0.1	*	0.3
Other	0.7	0.3	0.3	0.1	0.2	0.7

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

NOTES: Fields of science and engineering and their disciplines were revised in FY 2015. Specifically, "Agricultural sciences and natural resources sciences" has been split into "Agricultural sciences" and "Natural resources and conservation." "Earth, atmospheric, and ocean sciences" and "Astronomy, chemistry, and physics" were relabeled "Geosciences, atmospheric, and ocean sciences" and "Physical sciences," respectively. Data were not collected separately for "Natural resources and conservation" prior to the FY 2015 survey and are included in the "Agricultural sciences" field for earlier cycles. Continuous data at the S&E field level is not available prior FYs 2006–07. New research space construction totaled 15.5 million NASF started in FYs 2002–03 and 10.1 million NASF started in FYs 2004–05. Details may not add to totals due to rounding.

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

million NASF). Not all planned projects are started during the projected time frame due to various factors, such as changing budgets and priorities. In FY 2013, academic institutions reported 8.8 million NASF of planned new research space construction for FY 2014 or FY 2015. However, the actual amount reported in FY 2015 for that period was 5.2 million NASF—59% of what was planned. Data from the previous two Facilities surveys indicate about 80% of planned new research space was started within the anticipated time frames.<sup>3</sup>

### New Construction Funding Sources

Twenty-two percent of the nation's 570 research-performing colleges and universities (126 institutions) initiated new construction of S&E research space in FYs 2014–15 with estimated completion costs of \$5.7 billion (table 3). The new construction costs

were an estimated 5.4% greater than projects started in FYs 2012–13. Yet these new construction costs were still lower than the amounts reported in every other 2-year period since FYs 1998–99, regardless of inflation.<sup>4</sup> The federal government provided 16% of the anticipated completion costs for new S&E research space construction in FYs 2014–15. Although the \$905 million of federal support is the most since data collection began in FYs 1986–87, over 60% of that funding was slated for the Facility for Rare Isotope Beams at Michigan State University. The facility is projected to be completed in 2022.<sup>5</sup>

Additionally, 64% of S&E research space new construction in FYs 2014–15 was funded by the institutions' own funds and other sources. State and local governments provided the remaining 20%, or \$1.2 billion.

### Repair and Renovation

Academic institutions expended \$4.1 billion on major repairs and renovation of S&E research space in FYs 2014–15 (table 4). Improvements to research space in health sciences comprised 25% of those costs. Substantial shares of overall costs for research space repair and renovation were accounted for by biological and biomedical sciences (24%), physical sciences (19%), and engineering (17%). Combined, these four major fields accounted for 85% of all research space repair and renovation costs.

Institutions anticipate \$3.9 billion in costs for planned repair and renovation with start dates in FY 2016 or FY 2017. They expect to spend about \$900 million improving research space in both health sciences and biological and biomedical sciences. In addition to these slated improvements, academic

TABLE 3. Source of funds for new construction of science and engineering research space in academic institutions started in FY 2014 or FY 2015, by type of institution  
(Funds in millions of dollars)

Type of institution	All sources	Government		Institutional funds and other sources <sup>a</sup>
		Federal	State and local	
All institutions	5,724.2	905.9	1,171.8	3,646.5
Doctorate granting	5,558.8	900.2	1,093.4	3,565.3
Public	3,591.7	736.6	1,059.3	1,795.8
Private	1,967.2	163.6	34.1	1,769.5
Nondoctorate granting	165.4	5.7	78.4	81.2

<sup>a</sup> 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.

NOTE: Details may not add to totals due to rounding.

SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, Survey of Science and Engineering Research Facilities, FY 2015.

TABLE 4. Costs for repair and renovation of science and engineering research space in academic institutions, by field and time of repair and renovation: FYs 2014–17  
(Costs in millions of dollars)

Field	Started in FY 2014 or FY 2015	Planned to start in FY 2016 or FY 2017	Deferred projects	
			Included in institutional plan	Not included in institutional plan
All research space	4,133.4	3,902.5	4,850.1	3,966.5
Agricultural sciences	55.0	103.9	399.5	249.6
Biological and biomedical sciences	1,005.2	902.5	1,183.1	893.3
Computer and information sciences	42.5	41.5	79.1	92.2
Engineering	707.3	736.9	559.5	664.8
Geosciences, atmospheric, and ocean sciences	150.4	108.6	249.2	181.0
Health sciences	1,023.9	884.7	982.9	781.1
Mathematics and statistics	52.5	22.5	58.1	62.5
Natural resources and conservation	43.0	20.5	61.2	13.1
Physical sciences	786.2	662.1	697.3	547.6
Psychology	113.1	99.6	246.0	147.8
Social sciences	134.8	187.2	262.5	269.6
Other	19.4	132.4	71.7	63.6

NOTES: Deferred projects are those that (1) are not funded and (2) are not scheduled for FY 2016 or FY 2017. Details may not add to totals due to rounding.

SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, Survey of Science and Engineering Research Facilities, FY 2015.

institutions reported another \$4.9 billion in deferred repair and renovation projects included in their institutional plans, as well as \$4.0 billion not included in their institutional plans. Projects in these latter categories were not funded and not scheduled to begin before FY 2018.

### Research Space at the Largest Institutions

Of the 570 institutions surveyed, the top 30 institutions ranked by total S&E NASF accounted for 35% of all research space in FY 2015 (table 5). This share is unchanged since FY 2013 and is less than the share in FY

2011 (36%). The top 30 also accounted for 52% of all research space in agricultural sciences and 44% of research space in natural resources and conservation fields. These institutions occupied less than 30% of the nation's research space in only three major fields: biological and biomedical

TABLE 5. Thirty institutions reporting the most FY 2015 research space in all fields: FYs 2011–15 (Net assignable square feet in thousands)

Rank	Institution	FY 2011	FY 2013	FY 2015
	All institutions	202,152	211,811	214,686
	Leading 30 institutions	73,150	74,246	75,101
1	U. Florida	3,038	3,110	4,156
2	U. Georgia	3,526	3,777	3,891
3	Johns Hopkins U.	3,144	3,265	3,811
4	U. Minnesota, Twin Cities	3,531	3,673	3,400
5	U. California, Davis	2,927	2,930	3,052
6	U. Illinois, Urbana-Champaign	4,631	3,109	3,034
7	Texas A&M U., College Station and Health Science Center	2,443	2,895	2,926
8	U. Wisconsin-Madison	2,936	2,774	2,904
9	U. California, Los Angeles	2,632	2,718	2,806
10	U. California, San Diego	2,421	2,555	2,694
11	North Carolina State U.	2,636	2,695	2,633
12	Pennsylvania State U., University Park and Hershey Medical Center	2,929	2,733	2,561
13	U. California, Berkeley	2,535	2,382	2,551
14	Michigan State U.	2,274	2,254	2,446
15	Harvard U.	2,334	2,482	2,420
16	U. Kentucky	2,230	2,287	2,394
17	Yale U.	2,079	2,307	2,372
18	Cornell U.	2,071	2,121	2,218
19	Washington State U.	1,948	2,055	2,161
20	Mississippi State U.	2,152	2,157	2,140
21	U. California, San Francisco	1,974	2,053	2,024
22	U. Washington, Seattle	1,874	1,796	1,935
23	Massachusetts Institute of Technology	2,070	2,023	1,927
24	U. Pittsburgh, Pittsburgh	1,467	1,614	1,882
25	Columbia U. in the City of New York	1,765	1,869	1,878
25	U. Michigan, Ann Arbor	1,793	1,897	1,878
27	Georgia Institute of Technology	1,706	1,633	1,782
28	Rutgers, State U. New Jersey, New Brunswick	1,107	1,167	1,772
29	U. Arizona	1,748	1,630	1,730
30	U. Pennsylvania	1,575	1,749	1,723

i = imputed.

NOTES: Totals for the leading 30 institutions reflect the institutions in the top 30 for FY 2015. Some institutions in the FY 2015 ranking were not in the top 30 prior to FY 2015. Tied institutions are ranked alphabetically.

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

sciences (26%), psychology (26%), and mathematics and statistics (27%).

## 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 the National Center for Science and Engineering

Statistics within the National Science Foundation. The survey is a census of 570 colleges and universities that expended at least \$1 million in S&E research and development funds in FY 2014. The response rate for this survey was 98%.

The full set of data tables will be available in the report *Science and Engi-*

*neering Research Facilities: Fiscal Year 2015* at <https://www.nsf.gov/statistics/facilities/>. Individual detailed tables from the FY 2015 survey may be available in advance of the full report. For further information, please contact the author. Current survey data for individual institutions are available from the WebCASPAR database system, a Web tool for retrieval and analysis of statistical data on science and engineering resources (<https://webcaspar.nsf.gov/>).

## 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

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2. Changes were made to some fields of science and engineering between FY 2005 and FY 2007, which include several field name changes and the disciplines included in fields. Consequently, there is a break in data continuity at the field level from FY 2005 to FY 2007.

3. The amount of new research space construction actually started in FYs 2012–13 (6.7 million NASF) was 80% of the total 8.4 million NASF initially planned and reported in FY 2011. In FY 2009, institutions planned to start 10.3 million NASF in FYs 2010–11, of which 79% was started during that period (8.1 million NASF).

4. Table 24 from the report *Science and Engineering Research Facilities*:

*Fiscal Year 2015* (<https://www.nsf.gov/statistics/facilities/>) accounts for new construction funding sources in current dollars for each biennial survey dating to FYs 1986–87. See Data Sources and Availability.

5. After adjustment for inflation, the previous highest total of federal funding for new construction of S&E research space reported in this survey was \$828.9 million (adjusted from

\$476.3 million in 1991 dollars to 2015 dollars) during FYs 1990–91. For information on federal funding of the Facility for Rare Isotope Beams, see [http://www.mlive.com/lansing-news/index.ssf/2014/01/michigan\\_state\\_frib\\_project\\_fu\\_1.html](http://www.mlive.com/lansing-news/index.ssf/2014/01/michigan_state_frib_project_fu_1.html) and <http://frib.msu.edu/index.php>.

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