



## InfoBrief

# R&D Expenditures at U.S. Universities Increased by \$8 Billion in FY 2022

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Research and development spending by academic institutions totaled \$97.8 billion in FY 2022, an increase of \$8.0 billion from FY 2021 ([table 1](#)). R&D expenditures funded by federal sources accounted for \$4.9 billion of the total increase. Universities’ internally funded R&D expenditures (institution funds) were \$2.1 billion greater than in FY 2021, while university R&D funded by businesses increased by \$587 million. The increases from these funding sources were the largest annual increases on record in current dollars. R&D expenditures funded by nonprofit organizations and by state and local governments also increased in FY 2022 by \$382 million and \$167 million, respectively. R&D funded by all other sources declined \$50 million from FY 2021, due in part to more accurate tracking and reporting of funding sources by institutions in the University of California system. The reported total funding from “all other sources” at these 11 institutions was \$234 million less than in FY 2021.

**Table 1**

**Higher education R&D expenditures, by source of funds: FYs 2010–22**

(Millions of current dollars)

Fiscal year	All R&D expenditures	Source of funds					
		Federal government	State and local government	Institution funds	Business	Nonprofit organizations	All other sources
2010	61,287	37,478	3,887	11,943	3,202	3,730	1,048
2011	65,274	40,768	3,851	12,580	3,183	3,854	1,038
2012	65,873	40,217	3,744	13,625	3,279	4,037	970
2013	67,109	39,510	3,706	14,938	3,515	3,903	1,537
2014	67,313	38,032	3,916	15,743	3,734	3,978	1,911
2015	68,664	37,911	3,864	16,608	4,009	4,236	2,037
2016	71,879	38,857	4,053	17,911	4,219	4,635	2,204
2017	75,292	40,319	4,187	18,886	4,439	5,159	2,302
2018	79,175	41,934	4,326	20,220	4,725	5,458	2,511
2019	83,643	44,539	4,520	21,114	5,064	5,705	2,702

**Table 1****Higher education R&D expenditures, by source of funds: FYs 2010–22**

(Millions of current dollars)

Fiscal year	All R&D expenditures	Source of funds					
		Federal government	State and local government	Institution funds	Business	Nonprofit organizations	All other sources
2020	86,440	46,182	4,603	22,022	5,187	5,758	2,688
2021	89,834	49,191	4,751	22,476	5,120	5,608	2,688
2022	97,842	54,053	4,918	24,536	5,707	5,990	2,638

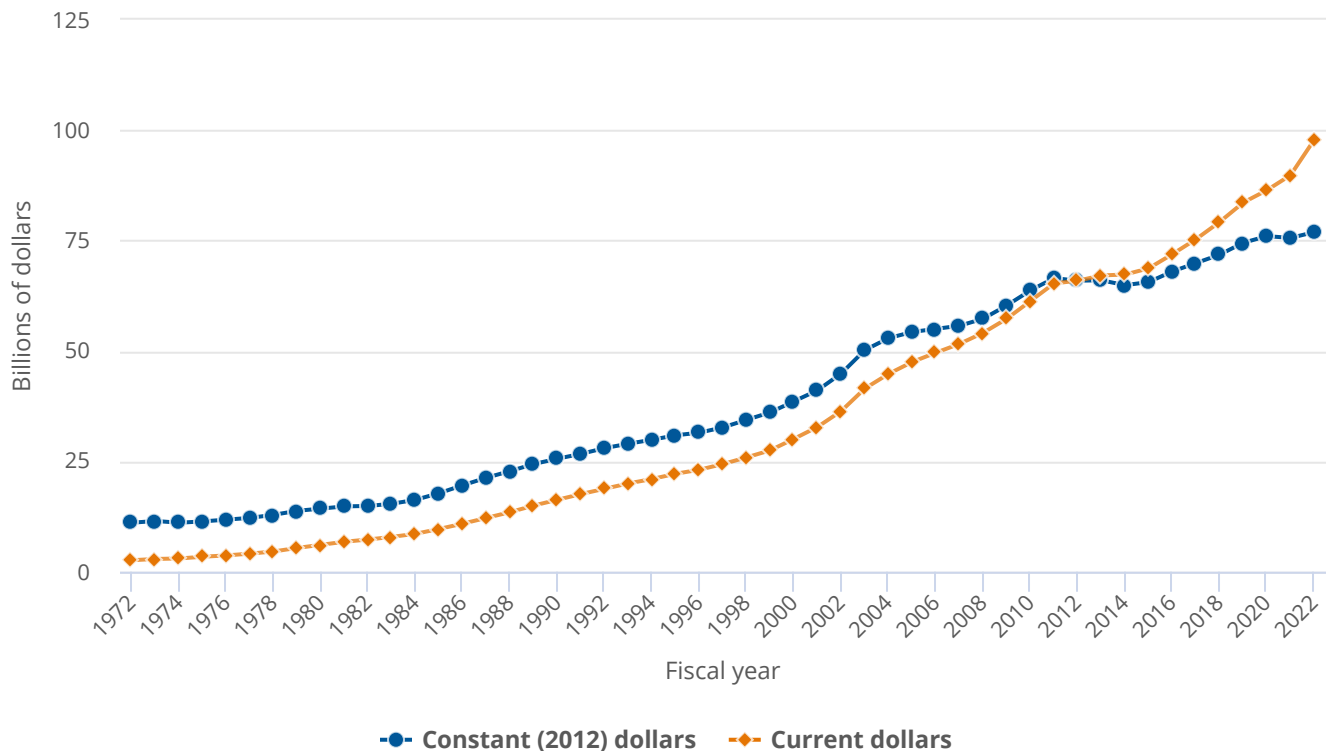
**Note(s):**

Because of rounding, detail may not add to total. Includes all institutions surveyed in the fiscal years shown.

**Source(s):**

National Center for Science and Engineering Statistics, Higher Education Research and Development Survey.

Higher education R&D since FY 2012 grew at an average annual rate of 4.0% in current dollars and 1.6% in constant dollars. Though, due to higher inflation, the difference between these percentages was largest during the FY 2020 to FY 2022 period as total R&D averaged 6.4% growth in current dollars but 0.6% growth in constant dollars (figure 1).<sup>1</sup> The data discussed in this report are from the Higher Education Research and Development (HERD) Survey, sponsored by the National Center for Science and Engineering Statistics (NCSES) within the National Science Foundation. For more information on the survey, see [“Data Sources, Limitations, and Availability.”](#)

**Figure 1****Higher education R&D expenditures: FYs 1972–2022**

**Note(s):**

Gross domestic product deflators come from the Bureau of Economic Analysis and are available in Table 1.1.9 "Implicit Price Deflators for Gross Domestic Product" at [https://www.bea.gov/iTable/index\\_nipa.cfm](https://www.bea.gov/iTable/index_nipa.cfm) (accessed September 2023).

**Source(s):**

National Center for Science and Engineering Statistics, Higher Education Research and Development Survey.

## R&D Expenditures, by Source of Funding

Federally funded R&D at universities totaled almost \$54 billion in FY 2022, which accounted for 55% of total expenditures (table 2). The Department of Health and Human Services (HHS), which includes the National Institutes of Health, supported the largest federal share of R&D at \$30.3 billion. This amounted to 31% of total R&D at higher education institutions in FY 2022 and 56% of total federal R&D support. The Department of Defense (DOD) (\$8.0 billion) and the National Science Foundation (\$6.0 billion) accounted for most of the remaining federally funded expenditures, while three other agencies supported between \$1.5 billion and \$2.5 billion of university R&D in FY 2022: the Department of Energy (DOE) (\$2.5 billion), the National Aeronautics and Space Administration (NASA) (\$2.0 billion), and the Department of Agriculture (USDA) (\$1.5 billion). All other federal agencies combined supported \$3.6 billion of higher education R&D in FY 2022.

**Table 2**

### Higher education R&D expenditures, by source of funds: FY 2022

(Millions of current dollars)

Source of funds	2022	% of total
All R&D expenditures	97,681	-
All federal R&D expenditures	53,971	55.3
DOD	7,979	8.2
DOE	2,488	2.6
HHS	30,289	31.0
NASA	2,044	2.1
NSF	6,036	6.2
USDA	1,501	1.5
Other	3,635	3.7
All nonfederal R&D expenditures	43,709	44.8
State and local government	4,907	5.0
Institution funds	24,493	25.1
Business	5,702	5.8
Nonprofit organizations	5,974	6.1
All other sources	2,633	2.7

DOD = Department of Defense; DOE = Department of Energy; HHS = Department of Health and Human Services; NASA = National Aeronautics and Space Administration; NSF = National Science Foundation; USDA = Department of Agriculture.

**Note(s):**

Because of rounding, detail may not add to total. Other includes all other agencies reported. This table includes only institutions reporting \$1 million or more in total R&D expenditures in FY 2021. Institutions reporting less than \$1 million in total R&D expenditures in FY 2021 completed a shorter version of the survey form in FY 2022 that did not include the question on specific agency funding sources. Total expenditures from institutions reporting less than \$1 million in R&D in FY 2022 was \$162 million.

**Source(s):**

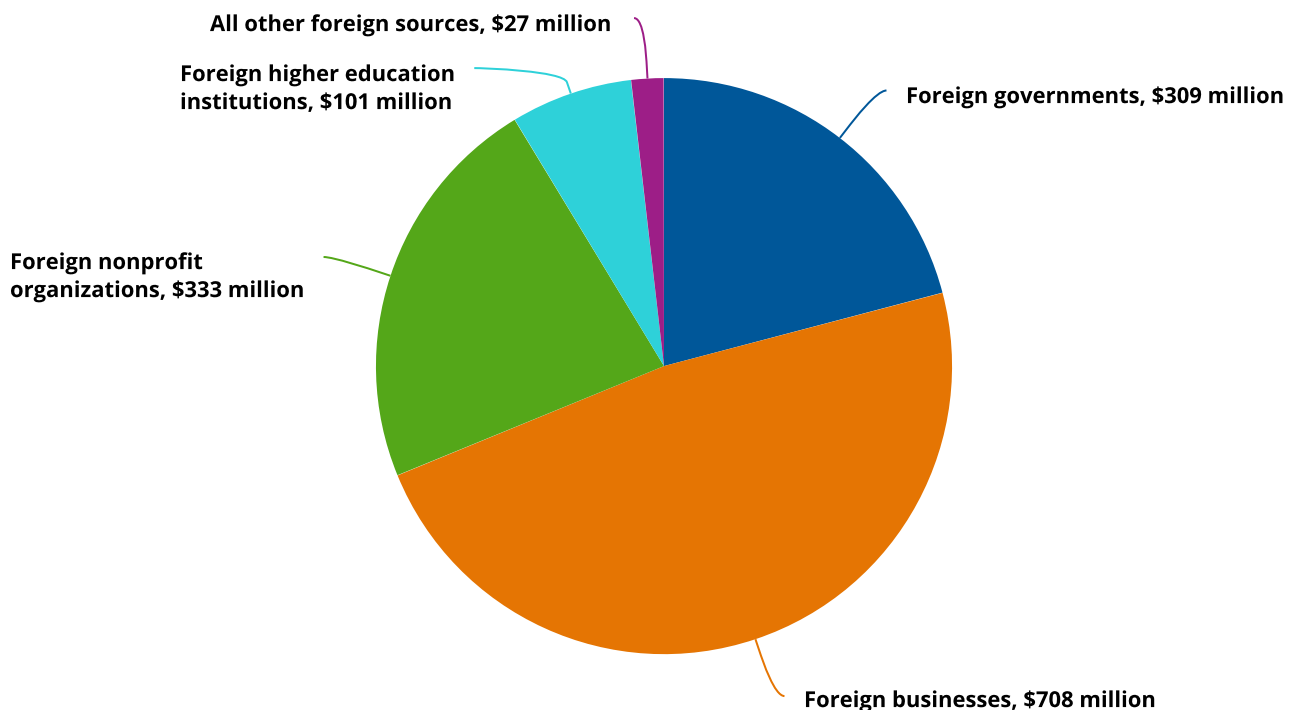
National Center for Science and Engineering Statistics, Higher Education Research and Development Survey.

Universities' own funding (\$24.5 billion) accounted for 25% of total R&D in FY 2022, which is similar to the percentage reported since 2016 (table 1). R&D expenditures funded by nonprofit organizations (\$6.0 billion) and businesses (\$5.7 billion) each supported around 6% of total R&D. State and local governments funded 5% or \$4.9 billion, while all other sources funded 2.7% (\$2.6 billion) of higher education R&D.

Foreign sources of R&D funding are also collected in the HERD Survey. About \$1.5 billion in foreign funds supported R&D at higher education institutions in FY 2022 ([figure 2](#)). Almost half of the foreign-funded expenditures (48%) originated from foreign businesses, while 23% were funded by foreign nonprofits and 21% were funded by foreign governments. Foreign higher education institutions (7%) and all other sources (2%) accounted for the rest of university foreign-funded R&D in FY 2022. Virtually all of the foreign-funded R&D was performed by doctorate-awarding institutions. Private institutions (\$766 million or 52% of the total) expended about \$50 million more of the foreign-funded R&D dollars than public institutions (\$714 million or 48% of the total).<sup>2</sup>

**Figure 2**

**Higher education R&D expenditures from foreign sources: FY 2022**



**Source(s):**

National Center for Science and Engineering Statistics, Higher Education Research and Development Survey.

## R&D Expenditures, by Field

R&D expenditures in all science fields combined increased by \$5.9 billion (8.4%) in FY 2022, reaching \$76.2 billion ([table 3](#)). Engineering R&D expenditures (\$15.6 billion total) increased by 9.1% (\$1.3 billion) and non-science and engineering R&D (\$5.9 billion total) increased by 14.5% (\$744 million). R&D expenditures in two life sciences subfields, health sciences (\$31.9 billion total, \$2.0 billion increase) and biological and biomedical sciences (\$18.2 billion total, \$1.6 billion increase), showed the largest dollar increases, accounting for 45% of the total university R&D growth in FY 2022.

**Table 3****Higher education R&D expenditures, by R&D field: FYs 2021–22**

(Millions of current dollars)

Field	2021	2022	% change in current dollars, FYs 2021–22	% change in constant 2012 dollars, FYs 2021–22
All R&D fields	89,695	97,681	8.9	1.8
Science	70,289	76,226	8.4	1.4
Computer and information sciences	2,953	3,225	9.2	2.1
Geosciences, atmospheric sciences, and ocean sciences	3,295	3,690	12.0	4.7
Atmospheric science and meteorology	624	669	7.2	0.2
Geological and earth sciences	1,242	1,371	10.4	3.2
Ocean sciences and marine sciences	1,035	1,211	17.0	9.4
Geosciences, atmospheric sciences, and ocean sciences nec	393	440	12.0	4.6
Life sciences	52,350	56,498	7.9	0.9
Agricultural sciences	3,553	3,936	10.8	3.5
Biological and biomedical sciences	16,566	18,161	9.6	2.5
Health sciences	29,859	31,870	6.7	-0.2
Natural resources and conservation	935	1,013	8.3	1.3
Life sciences nec	1,436	1,518	5.7	-1.2
Mathematics and statistics	773	880	13.8	6.4
Physical sciences	5,737	6,168	7.5	0.5
Astronomy and astrophysics	741	814	9.9	2.7
Chemistry	1,996	2,127	6.6	-0.4
Materials science	286	286	0.0	-6.5
Physics	2,464	2,669	8.3	1.2
Physical sciences nec	251	271	8.0	0.9
Psychology	1,330	1,444	8.6	1.5
Social sciences	2,828	3,165	11.9	4.6
Anthropology	108	133	23.1	15.1
Economics	550	668	21.5	13.5
Political science and government	424	488	15.1	7.6
Sociology, demography, and population studies	553	616	11.4	4.1
Social sciences nec	1,193	1,260	5.6	-1.3
Sciences nec	1,025	1,156	12.8	5.4
Engineering	14,292	15,597	9.1	2.0
Aerospace, aeronautical, and astronautical engineering	1,452	1,647	13.4	6.0
Bioengineering and biomedical engineering	1,560	1,726	10.6	3.4
Chemical engineering	1,024	1,108	8.2	1.1
Civil engineering	1,482	1,647	11.1	3.9
Electrical, electronic, and communications engineering	3,079	3,437	11.6	4.3
Industrial and manufacturing engineering	574	615	7.1	0.1
Mechanical engineering	1,882	2,063	9.6	2.4
Metallurgical and materials engineering	842	887	5.3	-1.5
Engineering nec	2,397	2,467	2.9	-3.8
Non-S&E	5,114	5,858	14.5	7.1
Business management and business administration	934	1,081	15.7	8.2
Communication and communications technologies	186	213	14.5	7.0
Education	1,616	1,741	7.7	0.7

**Table 3****Higher education R&D expenditures, by R&D field: FYs 2021–22**

(Millions of current dollars)

Field	2021	2022	% change in current dollars, FYs 2021–22	% change in constant 2012 dollars, FYs 2021–22
Humanities	561	714	27.3	18.9
Law	283	359	26.9	18.6
Social work	320	363	13.4	6.0
Visual and performing arts	178	225	26.4	18.1
Non-S&E nec	1,037	1,162	12.1	4.7

nec = not elsewhere classified; S&amp;E = science and engineering.

**Note(s):**

This table includes only institutions reporting \$1 million or more in total R&D expenditures in FY 2021. Institutions reporting less than \$1 million in total R&D expenditures in FY 2021 completed a shorter version of the survey form in FY 2022 that did not include this question. Total expenditures from institutions reporting less than \$1 million in R&D in FY 2022 was \$162 million. Gross domestic product deflators come from the Bureau of Economic Analysis and are available in Table 1.1.9 "Implicit Price Deflators for Gross Domestic Product" at [https://www.bea.gov/iTable/index\\_nipa.cfm](https://www.bea.gov/iTable/index_nipa.cfm) (accessed September 2023).

**Source(s):**

National Center for Science and Engineering Statistics, Higher Education Research and Development Survey.

When adjusted for inflation, total university R&D increased by 1.8% in FY 2022.<sup>3</sup> Several R&D subfields declined in inflation-adjusted dollars from FY 2021. Health sciences, which is the largest R&D field, was down 0.2%. Other fields with lower inflation-adjusted R&D expenditures in FY 2022 include materials science (down 6.5%), metallurgical and materials engineering (down 1.5%), and chemistry (down 0.4%). R&D fields "not elsewhere classified" within engineering, social sciences, and life sciences respectively declined between 1.2% and 3.8% in inflation-adjusted terms.

**R&D Expenditures, by Type of Cost**

Of the \$97.7 billion in total FY 2022 R&D expenditures, higher education institutions identified \$75.4 billion in direct costs and \$22.3 billion in indirect costs (table 4). Salaries, wages, and fringe benefits paid to R&D personnel (\$43.1 billion) accounted for the largest portion of direct costs. Other direct costs, including (but not limited to) travel, tuition, waivers, computer usage fees, supplies, and services, such as consulting, amounted to over \$20.9 billion. Institutions also passed R&D funding totaling \$8.5 billion to other universities (\$4.7 billion) or other organizations excluding contractors or other vendors (\$3.8 billion) as part of their FY 2022 direct costs.<sup>4</sup> Among indirect costs, \$16.1 billion of facilities and administrative costs were reimbursed from external R&D sponsors. Another \$6.2 billion was identified as unrecovered indirect costs.<sup>5,6</sup>

**Table 4****Higher education R&D expenditures, by type of cost: FY 2022**

(Millions of current dollars)

Type of cost	R&D expenditures
All costs	97,681
Direct costs	75,400
Salaries, wages, and fringe benefits	43,077
Software purchases	193
Noncapitalized software	178
Capitalized software	15
Capitalized equipment	2,701
Passed through to subrecipients	8,521

**Table 4****Higher education R&D expenditures, by type of cost: FY 2022**

(Millions of current dollars)

Type of cost	R&D expenditures
Other direct costs	20,908
Indirect costs	22,281
Recovered	16,107
Unrecovered	6,174

**Note(s):**

This table includes only institutions reporting \$1 million or more in total R&D expenditures in FY 2021. Institutions reporting less than \$1 million in total R&D expenditures in FY 2021 completed a shorter version of the survey form in FY 2022 that did not include this question. Total expenditures from institutions reporting less than \$1 million in R&D in FY 2022 was \$162 million.

**Source(s):**

National Center for Science and Engineering Statistics, Higher Education Research and Development Survey.

## Top University Research Performers

The top 30 institutions in terms of R&D expenditures accounted for 42% of the total spent on R&D within the higher education sector in FY 2022, which is consistent with the preceding years ([table 5](#)). Twenty-nine institutions reported at least \$1 billion in R&D expenditures in FY 2022, compared with 21 institutions in FY 2020. Sixteen of the top 30 institutions were public, accounting for \$21.8 billion in total R&D expenditures; 14 were private, accounting for \$19.5 billion. Institutions with medical schools were well-represented in the top 30, with 27 reporting medical school R&D expenditures.<sup>7</sup>

**Table 5****Thirty institutions reporting the largest FY 2022 R&D expenditures in all fields: FYs 2020–22**

(Millions of current dollars)

Institution	Rank	2020	2021	2022
All institutions	-	86,302	89,695	97,681
Leading 30 institutions	-	36,630	38,126	41,266
Johns Hopkins U. <sup>a</sup>	1	3,110	3,181	3,420
U. California, San Francisco	2	1,651	1,710	1,806
U. Pennsylvania	3	1,579	1,632	1,791
U. Michigan, Ann Arbor	4	1,674	1,640	1,771
U. Washington, Seattle	5	1,457	1,489	1,560
U. California, Los Angeles	6	1,393	1,455	1,536
U. California, San Diego	7	1,404	1,425	1,533
U. Wisconsin-Madison	8	1,364	1,380	1,524
Duke U.	9	1,197	1,238	1,391
Stanford U.	10	1,204	1,274	1,385
Ohio State U.	11	968	1,236	1,363
U. North Carolina, Chapel Hill	12	1,160	1,206	1,361
Harvard U.	13	1,240	1,254	1,308
Cornell U.	14	1,190	1,184	1,300
New York U.	15	947	1,064	1,276
U. Pittsburgh, Pittsburgh	16	1,106	1,135	1,252
Georgia Institute of Technology	17	1,049	1,114	1,231
Columbia U. in the City of New York	18	1,033	1,099	1,231
U. Maryland <sup>b</sup>	19	1,103	1,142	1,229

**Table 5****Thirty institutions reporting the largest FY 2022 R&D expenditures in all fields: FYs 2020–22**

(Millions of current dollars)

Institution	Rank	2020	2021	2022
U. Minnesota, Twin Cities	20	1,042	1,073	1,202
Yale U.	21	1,094	1,165	1,191
U. Texas M. D. Anderson Cancer Center	22	1,051	1,125	1,183
Texas A&M U., College Station and Health Science Center	23	1,131	1,148	1,153
Vanderbilt U. and Vanderbilt U. Medical Center	24	825	1,019	1,086
U. Florida	25	942	960	1,086
Washington U., Saint Louis	26	920	989	1,047
U. Southern California	27	941	956	1,040
Pennsylvania State U., University Park and Hershey Medical Center	28	992	971	1,020
Northwestern U.	29	875	913	1,001
Massachusetts Institute of Technology	30	988	949	989

<sup>a</sup> Johns Hopkins University includes the Applied Physics Laboratory, with \$2,056 million in total R&D expenditures in FY 2022.

<sup>b</sup> University of Maryland includes expenditures from 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 2019, both campuses reported to the Higher Education Research and Development Survey as separate institutions.

**Note(s):**

Because of rounding, detail may not add to total. Rankings are based on unrounded totals. This table reflects the leading 30 institutions for FY 2022; the institutions listed may not be in the top 30 of prior fiscal years.

**Source(s):**

National Center for Science and Engineering Statistics, Higher Education Research and Development Survey.

The same institutions were ranked in the top 30 in FY 2021 and FY 2022. Only three institutions changed more than 3 positions: New York University moved up 8 positions to number 15, Yale University moved down 6 positions to number 21, and Texas A&M University, College Station and Health Science Center moved from number 16 in FY 2021 to number 23 in FY 2022.

## Data Sources, Limitations, and Availability

The higher education R&D expenditures data were collected from a census of 900 universities and colleges that grant a bachelor's degree or higher and expended at least \$150,000 in R&D in FY 2021. To reduce respondent burden, the HERD Survey requests abbreviated data (short form) from institutions reporting less than \$1 million in R&D expenditures during the previous fiscal year. Except for the totals reported in [table 1](#) and [figure 1](#), all other totals shown in this report exclude expenditures from the 263 institutions that completed the short-form version of the survey. The institutions completing the short-form survey accounted for \$162 million (0.2%) of total higher education R&D expenditures in FY 2022.

The fiscal year referred to throughout this report is the academic fiscal year. For most academic institutions, FY 2022 represents 1 July 2021 through 30 June 2022.

The amounts reported include all funds expended for activities specifically organized to produce research outcomes and either sponsored by an outside organization or separately accounted for using institution funds. R&D expenditures at university-administered federally funded research and development centers (FFRDCs) are collected in a separate survey, the FFRDC Research and Development Survey, available at <https://nces.nsf.gov/surveys/ffrdc-research-development/>.

The full set of data tables and technical information from this survey are available at <https://nces.nsf.gov/surveys/higher-education-research-development/2022#data>.



## Notes

- 1 Dollars adjusted for inflation (i.e., constant dollars) are based on the gross domestic product (GDP) implicit price deflator, currently in 2012 dollars, as published by the Bureau of Economic Analysis (BEA) at [https://www.bea.gov/iTable/index\\_nipa.cfm](https://www.bea.gov/iTable/index_nipa.cfm), accessed on 1 September 2023. Note that GDP deflators are calculated on an economy-wide scale and do not explicitly focus on R&D.
- 2 For more details on R&D expenditures funded by foreign sources, see table 15 at <https://nces.nsf.gov/surveys/higher-education-research-development/2022#data>.
- 3 See endnote 1 for constant dollar details.
- 4 For more details on R&D expenditures passed through to subrecipients, see tables 4, 74–77, and 85 in the survey's [FY 2022 detailed data tables](#).
- 5 For more information on the definitions and collection of these fields, see the HERD questionnaire and technical notes at <https://nces.nsf.gov/surveys/higher-education-research-development/2022#methodology>.
- 6 Unrecovered indirect cost means the difference between the amount charged to a federal award and the amount that could have been charged to a federal award under a nonfederal entity's approved negotiated indirect cost rate.
- 7 For more details on R&D expenditures at institutions with medical schools, see table 72 in the survey's [FY 2022 detailed data tables](#).

## Suggested Citation

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