

Research Expenditures Summary September 1, 2015 – August 31, 2016

Texas Universities and Health-Related Institutions

May 2017

Texas Higher Education Coordinating Board



Texas Higher Education
Coordinating Board

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Agency Mission

The Texas Higher Education Coordinating Board promotes access, affordability, quality, success, and cost efficiency in the state's institutions of higher education, through *Closing the Gaps* and its successor plan, resulting in a globally competent workforce that positions Texas as an international leader in an increasingly complex world economy.

Agency Vision

The THECB will be recognized as an international leader in developing and implementing innovative higher education policy to accomplish our mission.

Agency Philosophy

The THECB will promote access to and success in quality higher education across the state with the conviction that access and success without quality is mediocrity and that quality without access and success is unacceptable.

The Coordinating Board's core values are:

Accountability: We hold ourselves responsible for our actions and welcome every opportunity to educate stakeholders about our policies, decisions, and aspirations.

Efficiency: We accomplish our work using resources in the most effective manner.

Collaboration: We develop partnerships that result in student success and a highly qualified, globally competent workforce.

Excellence: We strive for preeminence in all our endeavors.

The Texas Higher Education Coordinating Board does not discriminate on the basis of race, color, national origin, gender, religion, age or disability in employment or the provision of services.

Citing this Report

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Executive Summary

The Texas Higher Education Coordinating Board's annual research expenditures report summarizes data submitted to the Board as required by Section 61.0662 of the Texas Education Code.

Data presented in this report were submitted by Texas public and independent universities and health-related institutions for Fiscal Year 2016 (September 1, 2015 through August 31, 2016). Highlights include:

- **All institutions.** Institutions reported research expenditures that totaled \$4,950,258,435 in Fiscal Year 2016, an increase of 3.8 percent over the previous year and an increase of 55.5 percent since Fiscal Year 2006.
- **Public institutions.** Research expenditures at public universities and health-related institutions increased from \$4,062,633,646 in FY 2015 to \$4,181,204,622 in FY 2016 (2.9%). The expenditures increased by \$2,476,852 at public universities (0.1%) and by \$116,094,124 at public health-related institutions (6.2%).
- **Independent institutions.** Research expenditures at independent universities increased from \$705,942,708 in FY 2015 to \$769,053,813 in FY 2016 (8.9%). The expenditures increased by \$16,554,672 at independent universities (7.8%) and by \$46,556,433 at independent health-related institutions (9.4%).
- **Research fields.** Research expenditures were greatest in the following fields for Fiscal Year 2016:
 - Medical Sciences: \$1,639,055,479
 - Biological and Other Life Sciences: \$1,081,160,955
 - Engineering: \$761,791,922
 - Physical Sciences: \$259,509,421
 - Environmental Sciences: \$255,979,276
- **Funding source.** The federal government, through the National Institutes of Health, the National Science Foundation, and other federal agencies, provided \$2,092,058,264 (42.3%) of the research funds expended. Expenditures from federal sources increased by \$52 million (2.6%) compared to Fiscal Year 2015.

According to data provided by the National Science Foundation for Fiscal Year 2014:

- Texas ranked third among all states in total research expenditures in all fields. Life sciences accounted for 60 percent of the research expenditures in Texas, followed by engineering (16%), geosciences (5%), and math and computer sciences (4%).
- The National Institutes of Health provided 59 percent, the National Science Foundation provided 13 percent, and the Department of Defense provided 12 percent of the federal research support to Texas higher education institutions that are counted under the federal measure for science and engineering obligations.
- Texas institutions of higher education ranked sixth in federal obligations for research and development in science and engineering, after California, New York, Maryland, Pennsylvania, and Massachusetts.

The data presented in this report are available in the Online Report System:
<http://www.thecb.state.tx.us/researchexpenditures>.

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Overview

The Texas Higher Education Coordinating Board's annual research expenditures report summarizes data submitted to the Board as required by Section 61.0662 of the Texas Education Code:

The board shall maintain an inventory of all institutional and programmatic research activities being conducted by the various institutions of higher education, whether state-financed or not. Once a year, on dates prescribed by the board, each institution of higher education shall report to the board all research conducted at that institution during the preceding year. Each institution's report must include the amounts spent by the institution on human embryonic stem cell research and adult stem cell research during the year covered by the report and the source of the funding for that research. All reports required by this section shall be made subject to the limitations imposed by security regulations governing defense contracts for research.

This report presents expenditure information rather than award information since expenditures more accurately reflect the current level of research activities. Research awards tend to fluctuate from year to year, which make them a less stable indicator for year-to-year comparisons. Institutions submit certified data reported in their Annual Financial Reports.

Definitions are provided in the research expenditures survey sent to the institutions. This approach ensures consistent reporting by institutions. However, even with these safeguards, institutions have some latitude in how they break out discipline-level expenditures.

Collection of research expenditure data is a challenging task for institutions. Administrators face many difficulties as they detail research expenditures at their institutions. For that reason, information reported by the institutions and the Coordinating Board's research expenditures report should be considered indicative rather than definitive.

A copy of the survey form completed by each institution is provided in the Appendix.

The data presented in this report are available in the Online Report System:
<http://www.thecb.state.tx.us/researchexpenditures>.

Major Findings

Total research expenditures at Texas public and independent universities and health-related institutions increased 3.8 percent from \$4,768,576,354 in FY 2015 to \$4,950,258,435 in FY 2016. Expenditures at public and independent universities and health-related institutions increased \$19,031,524 (0.8%) and \$162,650,557 (6.8%), respectively, compared to Fiscal Year 2015.

The 10 top-ranked institutions are listed in Table 1, based on the total amount of research and development from all sources of funding. Figures 1 and 2 provide separate summaries of total research expenditures for public and private institutions and for health-related institutions. A complete list of funding by institution is provided in Table 8.

The top 10 institutions in research spending accounted for 79.9 percent of the total research expenditures. Collectively, the top five institutions in research spending accounted for 62.6 percent of total research expenditures. Six of the state's health-related institutions ranked among the top 10 Texas public institutions in research expenditures.

The first six institutions in Table 1 also appear in the top 100 rankings of National Science Foundation's list of institutions reporting the largest Fiscal Year 2015 research and development expenditures in all fields.¹

Table 1. Research and Development Expenditures Rankings, FY 2016.

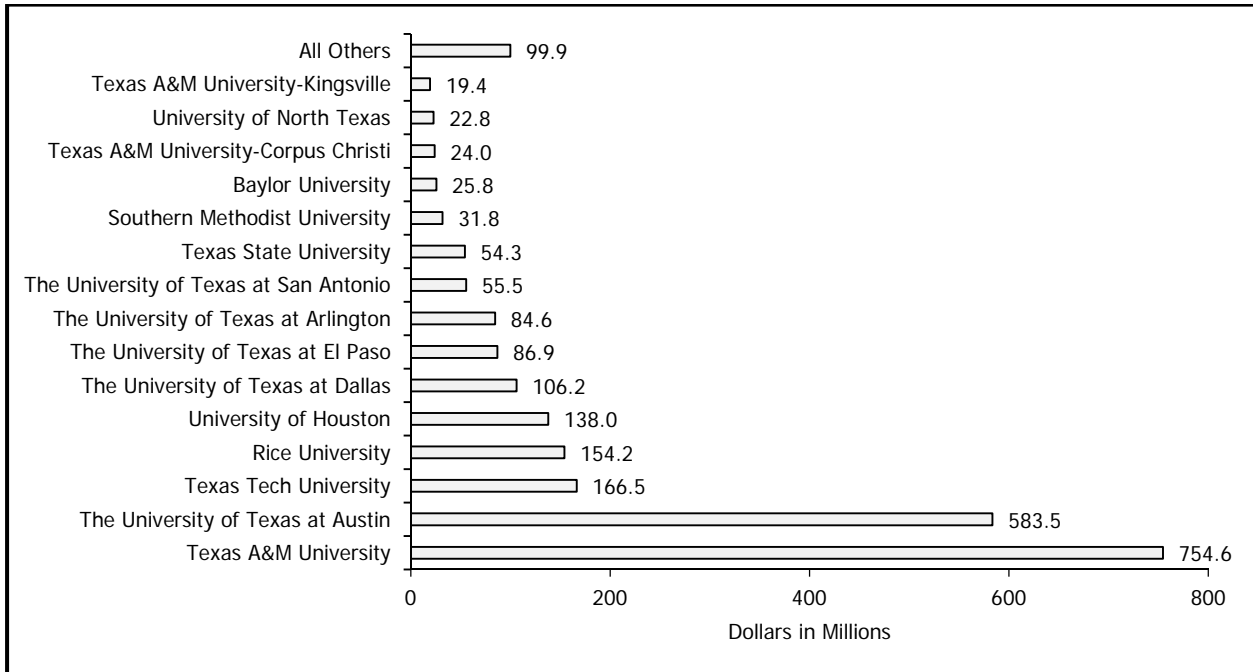
Research and development expenditures at institutions are ranked on the total amount of research from all sources of funding to include federal, state appropriations, state and local contracts and grants, institution sources, and private funds.

Institution	2012	2013	2014	2015	2016
The University of Texas M.D. Anderson Cancer Center	1	1	1	1	1
Texas A&M University (including Texas A&M Services)	2	2	2	2	2
The University of Texas at Austin	3	3	3	3	3
Baylor College of Medicine	4	4	4	4	4
The University of Texas Southwestern Medical Center	5	5	5	5	5
The University of Texas Health Science Center at Houston	6	6	6	6	6
The University of Texas Health Science Center at San Antonio	7	7	8	9	7
Texas Tech University	9	9	7	7	8
Rice University	10	10	10	8	9
The University of Texas Medical Branch at Galveston	8	8	9	10	10

Source: Texas Higher Education Coordinating Board

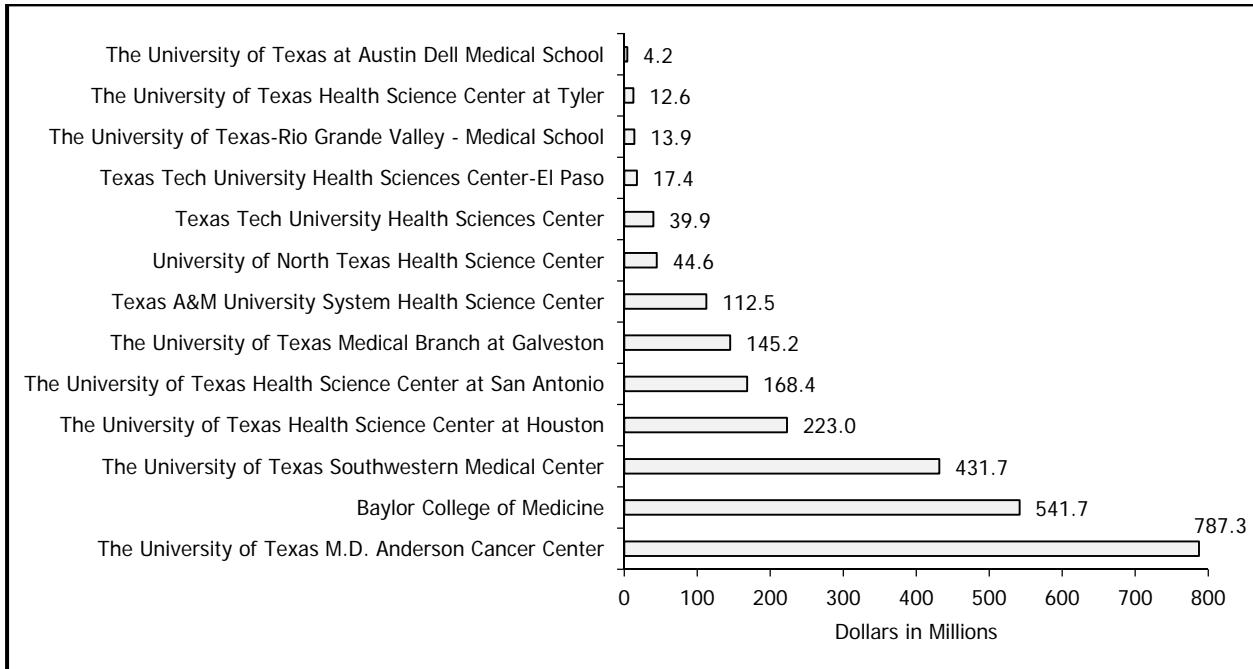
¹ National Science Foundation, National Center for Science and Engineering Statistics, Higher Education Research and Development Survey, Fiscal Year 2015, Table 16. Higher education Research and Development (R&D) expenditures, ranked by FY 2015 R&D expenditures: FYs 2006-2015, Retrieved from <https://ncesdata.nsf.gov/herd/2015/>

Figure 1. Expenditures for Research and Development at Texas Universities, FY 2016



Source: Texas Higher Education Coordinating Board

Figure 2. Expenditures for Research and Development at Texas Health-Related Institutions, FY 2016



Source: Texas Higher Education Coordinating Board

Table 2. Federal/State Research and Development Expenditures Ratio Rankings, FY 2016

The ratio of federal funds to state-appropriated funds for each of the top 10 Texas institutions reporting the greatest research expenditures.

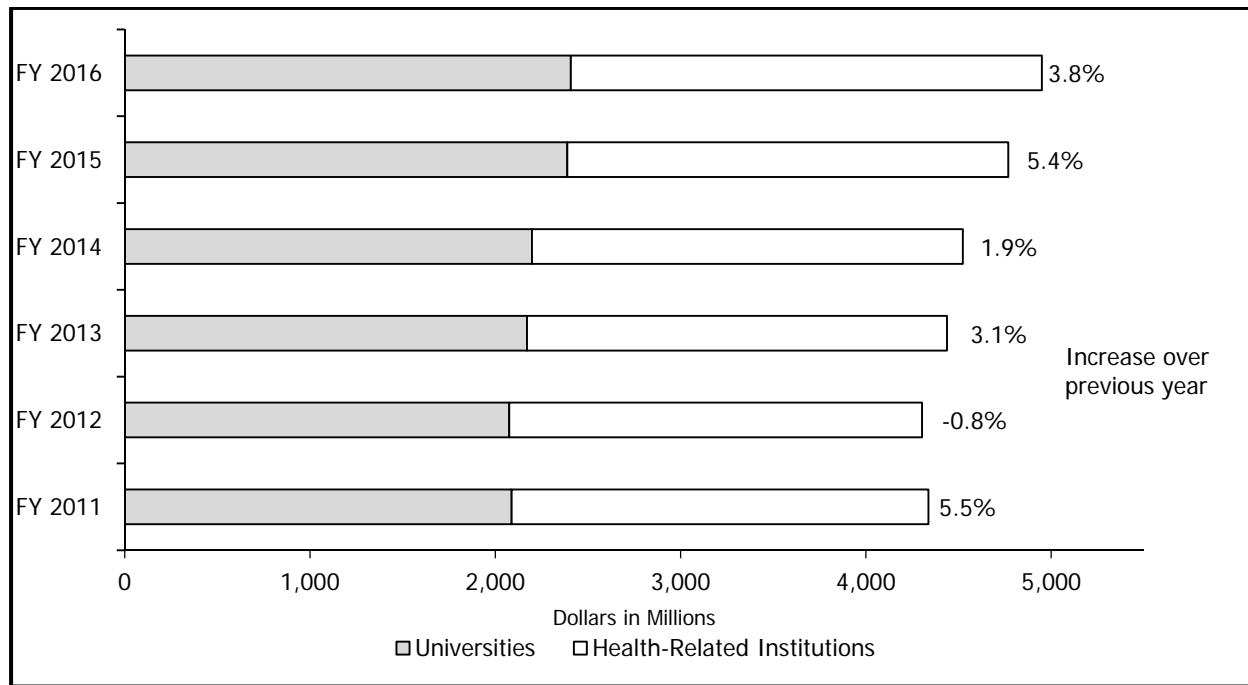
Institution	R&D Rank	Fed/State Ratio	Ratio Rank
The University of Texas Medical Branch at Galveston	10	21.9	1
Rice University	9	11.3	2
Baylor College of Medicine	4	9.9	3
The University of Texas at Austin	3	7.4	4
The University of Texas Health Science Center at San Antonio	7	6.4	5
The University of Texas Health Science Center at Houston	6	3.4	6
The University of Texas Southwestern Medical Center	5	2.2	7
Texas A&M University (including Texas A&M Services)	2	1.6	8
The University of Texas M.D. Anderson Cancer Center	1	0.6	9
Texas Tech University	8	0.4	10

Source: Texas Higher Education Coordinating Board

Figure 3 shows growth rates in research and development expenditures for public and independent universities and health-related institutions. Expenditures were \$181.7 million more in Fiscal Year 2016, than in Fiscal Year 2015, with increases of \$19.0 million at universities and \$162.7 million at health-related institutions.

Single digit growth occurred in recent fiscal years. Negative growth in Fiscal Year 2012 occurred for the first time since 1971.

Figure 3. Growth Rates in Research and Development Expenditures at Texas Public and Independent University and Health-Related Institutions FY 2011 – FY 2016



Source: Texas Higher Education Coordinating Board

Statewide Summary Data

Table 3 presents total expenditures and sources of funds for research and development at Texas public and independent universities and health-related institutions. Expenditures from federal sources increased overall by \$52.6 million (2.6%) compared to Fiscal Year 2015; federal funds increased by \$17.1 million (1.6%) for Texas public and independent universities and \$35.4 million (3.6%) for health-related institutions.

Table 3. Sources of Funds for Research and Development, FY 2016

	Federal	State and Local		Institution	Private		Total
		Appropriated	Contracts and Grants		Profit	Non-Profit	
Public							
Health-Related Institutions	\$758,960,125	\$339,305,734	\$137,586,614	\$230,488,140	\$159,943,868	\$374,275,702	\$2,000,560,183
Universities	956,432,685	322,565,082	123,115,001	403,648,825	170,896,136	203,986,710	2,180,644,439
Total - Public	1,715,392,810	661,870,816	260,701,615	634,136,965	330,840,004	578,262,412	4,181,204,622
Independent							
Health-Related Institutions	267,848,898	3,822,642	23,340,853	178,608,561	23,742,357	44,330,933	541,694,244
Universities	108,816,556	9,082	9,755,710	68,606,118	16,500,205	23,671,898	227,359,569
Total - Independent	376,665,454	3,831,724	33,096,563	247,214,679	40,242,562	68,002,831	769,053,813
All Institutions							
Health-Related Institutions	1,026,809,023	343,128,376	160,927,467	409,096,701	183,686,225	418,606,635	2,542,254,427
Universities	1,065,249,241	322,574,164	132,870,711	472,254,943	187,396,341	227,658,608	2,408,004,008
Total - All Institutions	\$2,092,058,264	\$665,702,540	\$293,798,178	\$881,351,644	\$371,082,566	\$646,265,243	\$4,950,258,435

**Federal
42.3%**

**State and Local
19.4%**

**Institution
17.8%**

**Private
20.6%**

Source: Texas Higher Education Coordinating Board

Table 4 presents expenditures in the 16 different fields as defined in the Instructions and Definitions for Survey (see Appendix). The Coordinating Board’s instructions directed institutions to assign project expenditures to only one field to avoid duplication.

Medical sciences led all other disciplines and accounted for 33.1 percent of the total research and development expenditures. The top five disciplines – medical sciences, biological and other life sciences, engineering, physical sciences, and environmental sciences – collectively accounted for 80.8 percent of all reported research expenditures.

For the most part, research fields in Table 4 reflect expenditures in particular academic disciplines. Some deviation may result, as institutions categorize all research as belonging to only one field. For example, a college of agriculture could perform basic research in biological sciences and report expenses in that field rather than in agricultural sciences.

Table 4. Expenditures for Conduct of R&D by Field, FY 2016 Texas Public and Independent Universities and Health-Related Institutions

Field	Total	% Total
Medical Sciences	\$1,639,055,479	33.1%
Biological and Other Life Sciences	1,081,160,955	21.8%
Engineering	761,791,922	15.4%
Physical Sciences	259,509,421	5.2%
Environmental Sciences	255,979,276	5.2%
Agricultural Sciences	230,012,390	4.6%
Computer Science	164,103,521	3.3%
Social Sciences	100,008,488	2.0%
Other Science Activities	92,450,503	1.9%
Education	80,815,764	1.6%
Other Non-Science Activities	77,798,435	1.6%
Psychology	60,294,984	1.2%
Mathematical Sciences	56,998,456	1.2%
Business Administration	37,825,441	0.8%
Arts and Humanities	29,224,400	0.6%
Law	23,229,000	0.5%
Total - All Institutions	\$4,950,258,435	

Source: Texas Higher Education Coordinating Board

Tables 5 and 6 show research expenditures in the 10 areas of special interest at universities and in the seven areas at health-related institutions. Human Stem Cells – Embryonic and Human Stem Cells – Adult were added to the Areas of Special Interest section in Fiscal Year 2013. Expenditures in Human Stem Cells – Embryonic increased at public and independent universities by \$20,070 from Fiscal Year 2015. At health-related institutions expenditures decreased from \$9,700,529 in Fiscal Year 2015 to \$8,120,958 in Fiscal Year 2016 (-0.2%) for Human Stem Cells – Adult research and increased from \$2,433,119 to \$3,784,469 (0.6%) for Human Stem Cells – Embryonic research.

Table 5. Expenditures for Conduct of R&D in Areas of Special Interest, FY 2016 Texas Public and Independent Universities

Field	Total
Microelectronics and Computer Technology	\$129,535,145
Energy	112,581,752
Biotechnology	92,589,418
Materials Science	85,638,678
Cancer Research	47,663,109
Aerospace Technology	34,656,595
Manufacturing Technology	24,407,381
Water Resources	21,715,826
Human Stem Cells - Embryonic	20,070
Human Stem Cells - Adult	0
Total – Texas Public and Independent Universities	\$548,807,974

Source: Texas Higher Education Coordinating Board

Table 6. Expenditures for Conduct of R&D in Areas of Special Interest, FY 2016 Texas Public and Independent Health-Related Institutions

Field	Total
Cancer Research	\$1,135,282,619
Child Health and Human Development	162,752,150
Cardiovascular Research	107,808,185
Mental Health	96,954,698
Aging	63,137,332
Human Stem Cells - Adult	8,120,958
Human Stem Cells - Embryonic	3,784,469
Total – Health-Related Institutions	\$1,577,840,411

Source: Texas Higher Education Coordinating Board

Table 7 shows the research expenditures in the area of Stem Cell Research by source of funds, as required by Texas Education Code, Section 61.662(d).

Table 7. Expenditures for Stem Cell Research by Source of Funds, Texas Public Universities and Health-Related Institutions, FY 2016

	Federal	State and Local		Institution	Private		Total
		Appropriated	Contracts & Grants		Profit	Non-Profit	
Human Stem Cells - Adult							
Independent - Universities							
Total for Independent - Universities	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Public - Universities							
Total for Public - Universities	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Independent - Health-Related							
Total for Independent - Health-Related	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Public - Health-Related							
The University of Texas Health Science Center at Houston	\$1,989,020	\$0	\$0	\$186,190	\$492,207	\$2,129,087	\$4,796,504
The University of Texas Health Science Center at San Antonio	1,742,035	0	517,143	25,946	64,959	418,433	2,768,516
The University of Texas M.D. Anderson Cancer Center	371,264	0	0	0	122,082	65,592	555,958
Total for Public - Health-Related	\$4,102,319	\$0	\$517,143	\$212,136	\$679,248	\$2,610,112	\$8,120,958
Total for All Health-Related Institutions	\$4,102,319	\$0	\$517,143	\$212,136	\$679,248	\$2,610,112	\$8,120,958
Total for Human Stem Cells - Adult	\$4,102,319	\$0	\$517,143	\$212,136	\$679,248	\$2,610,112	\$8,120,958
Human Stem Cells - Embryonic							
Independent - Universities							
Total for Independent - Universities	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Public - Universities							
The University of Texas and Austin	\$0	\$0	\$0	\$0	\$0	\$20,070	\$20,070
Total for Public - Universities	\$0	\$0	\$0	\$0	\$0	\$20,070	\$20,070
Total for All Universities	\$0	\$0	\$0	\$0	\$0	\$20,070	\$20,070
Independent - Health-Related							
Baylor College of Medicine	\$0	\$0	\$0	\$0	\$0	\$22,377	\$22,377
Total for Independent - Health-Related	\$0	\$0	\$0	\$0	\$0	\$22,377	\$22,377
Public - Health-Related							
Texas Tech University Health Sciences Center	\$206,742	\$0	\$0	\$0	\$0	\$0	\$206,742
The University of Texas Health Science Center at Houston	2,665,016	0	194,287	0	0	670,536	3,529,839
The University of Texas Health Science Center at San Antonio	0	0	0	0	0	25,511	25,511
Total for Public - Health-Related	\$2,871,758	\$0	\$194,287	\$0	\$0	\$696,047	\$3,762,092
Total for All Health-Related Institutions	\$2,871,758	\$0	\$194,287	\$0	\$0	\$718,424	\$3,784,469
Total for Human Stem Cells - Embryonic	\$2,871,758	\$0	\$194,287	\$0	\$0	\$738,494	\$3,804,539

Source: Texas Higher Education Coordinating Board

Institutional Data

This section of the report presents detailed information on research expenditures reported by institution. Definitions for sources of funds and research fields are found in the Appendix.

Table 8. Total Expenditures for Research by Source of Funds, Texas Public and Independent Universities and Health-Related Institutions, FY 2016

	Federal	State and Local		Institution	Private		Total
		Appropriated	Contracts & Grants		Profit	Non-Profit	
Independent - Universities							
Abilene Christian University	\$361,516	\$0	\$0	\$204,604	\$0	\$44,125	\$610,245
Baylor University	4,243,955	0	915,143	16,288,311	1,646,441	2,667,015	25,760,865
Letourneau University	284,674	0	2,375	45,882	77,343	202,175	612,449
Rice University	83,273,000	0	7,397,784	37,577,340	10,969,252	14,963,220	154,180,596
Southern Methodist University	15,587,061	0	759,571	10,594,728	3,683,896	1,192,741	31,817,997
St. Edward's University	1,174,431	9,082	0	654,978	19,690	60,229	1,918,410
Texas Christian University	2,598,307	0	680,837	2,368,522	0	3,993,798	9,641,464
Trinity University	772,637	0	0	783,501	103,583	502,069	2,161,790
University of the Incarnate Word	520,975	0	0	88,252	0	46,526	655,753
Total for Independent - Universities	\$108,816,556	\$9,082	\$9,755,710	\$68,606,118	\$16,500,205	\$23,671,898	\$227,359,569
Public - Universities							
Angelo State University	\$156,210	\$511,939	\$192,701	\$4,475	\$48,074	\$125,439	\$1,038,838
Lamar University	617,233	870,968	150,955	72,596	239,382	280,612	2,231,746
Midwestern State University	23,392	0	0	0	0	492,974	516,366
Prairie View A&M University	7,951,824	2,852,462	60,374	1,533,124	57,287	35,573	12,490,644
Sam Houston State University	1,821,123	0	115,154	2,503,283	73,847	131,537	4,644,944
Stephen F. Austin State University	1,630,211	1,069,156	112,008	1,046,970	80,346	585,318	4,524,009
Sul Ross State University	272,489	329,089	0	523,935	17,477	598,434	1,741,424
Tarleton State University	4,506,197	1,806,227	1,397,277	1,214,888	15,728	151,297	9,091,614
Texas A&M International University	929,392	1,232,832	0	555,560	71,732	952,868	3,742,384
Texas A&M University	285,485,900	116,615,219	56,641,270	167,140,210	48,207,562	80,559,161	754,649,322
Texas A&M University at Galveston	2,495,007	776,271	607,917	1,366,283	118,325	3,165,781	8,529,584
Texas A&M University-Central Texas	0	0	182	307,938	14,174	53,464	375,758
Texas A&M University-Commerce	878,486	429,988	476,005	687,008	61,778	135,182	2,668,447
Texas A&M University-Corpus Christi	8,668,947	2,333,119	2,596,321	3,685,546	757,708	5,934,692	23,976,333
Texas A&M University-Kingsville	7,477,173	3,093,794	982,871	2,123,977	417,789	5,292,597	19,388,201
Texas A&M University-San Antonio	128,580	0	0	0	40,414	18,115	187,109

Table 8. (continued)

	Federal	State and Local		Institution	Private		Total
		Appropriated	Contracts & Grants		Profit	Non-Profit	
Texas A&M University-Texarkana	77,830	39,237	0	70	0	0	117,137
Texas Southern University	3,378,395	126,798	354,373	414,354	111,114	219,853	4,604,887
Texas State University	21,049,270	9,030,947	7,370,277	10,724,845	1,261,655	4,861,346	54,298,340
Texas Tech University	32,404,692	72,498,277	6,329,220	28,719,741	15,883,313	10,658,964	166,494,207
Texas Woman's University	573,354	775,660	0	611,323	42,280	875,834	2,878,451
The University of Texas at Arlington	28,572,255	14,197,727	3,835,638	28,007,597	4,287,310	5,726,907	84,627,434
The University of Texas at Austin	357,166,877	24,517,474	23,892,876	66,305,575	78,485,938	33,178,746	583,547,486
The University of Texas at Dallas	35,450,709	9,492,131	2,371,647	32,409,807	5,504,530	20,975,161	106,203,985
The University of Texas at El Paso	42,886,101	15,474,649	3,419,646	11,292,550	1,403,033	12,376,880	86,852,859
The University of Texas at San Antonio	24,899,939	13,362,481	1,803,528	7,177,454	3,438,215	4,863,819	55,545,436
The University of Texas at Tyler	363,719	131,556	342,813	233,399	137,086	197,266	1,405,839
The University of Texas of the Permian Basin	522,855	162,582	-313,403	17,533	10,577	116,024	516,168
The University of Texas-Rio Grande Valley	9,429,050	2,313,157	19,896	1,830,314	291,461	931,635	14,815,513
University of Houston	59,614,128	23,969,844	9,635,284	28,492,468	8,092,860	8,148,431	137,953,015
University of Houston-Clear Lake	756,414	432,702	48,519	199,870	25,682	115,389	1,578,576
University of Houston-Downtown	1,688,143	225,597	27,477	256,775	145,707	0	2,343,699
University of Houston-Victoria	178,171	0	0	0	0	0	178,171
University of North Texas	12,620,150	2,250,800	559,426	3,877,541	1,324,805	2,159,230	22,791,952
University of North Texas at Dallas	23,385	0	0	23,005	0	0	46,390
West Texas A&M University	1,735,084	1,642,399	84,749	288,811	228,947	68,181	4,048,171
Total for Public - Universities	\$956,432,685	\$322,565,082	\$123,115,001	\$403,648,825	\$170,896,136	\$203,986,710	\$2,180,644,439
Total for All Universities	\$1,065,249,241	\$322,574,164	\$132,870,711	\$472,254,943	\$187,396,341	\$227,658,608	\$2,408,004,008
Independent - Health-Related							
Baylor College of Medicine	\$267,848,898	\$3,822,642	\$23,340,853	\$178,608,561	\$23,742,357	\$44,330,933	\$541,694,244
Public - Health-Related							
Texas A&M University System Health Science Center	\$38,066,343	\$24,166,840	\$15,205,684	\$10,537,127	\$7,228,251	\$17,297,246	\$112,501,491
Texas Tech University Health Sciences Center	10,383,734	13,124,813	2,557,040	8,764,441	454,048	4,634,139	39,918,215
Texas Tech University Health Sciences Center-El Paso	3,064,455	11,005,930	351,884	1,734,030	339,807	857,143	17,353,249
The University of Texas Health Science Center at Houston	121,097,998	20,692,512	15,324,789	16,920,240	11,745,651	37,210,023	222,991,213
The University of Texas Health Science Center at San Antonio	101,627,057	9,557,900	6,409,940	18,374,680	18,871,541	13,597,007	168,438,125
The University of Texas Health Science Center at Tyler	4,543,764	4,039,864	298,646	1,722,932	520,817	1,459,233	12,585,256
The University of Texas M.D. Anderson Cancer Center	155,043,500	208,063,540	40,237,210	128,116,128	89,454,455	166,374,314	787,289,147
The University of Texas Medical Branch at Galveston	100,463,454	630,879	3,950,228	17,708,307	4,051,106	18,351,901	145,155,875
The University of Texas Southwestern Medical Center	189,930,801	37,065,852	50,655,843	19,361,165	24,154,657	110,526,314	431,694,632
The University of Texas at Austin Dell Medical School	143,582	0	184,757	1,119,771	46,261	2,700,000	4,194,371

Table 8. (continued)

	Federal	State and Local		Institution	Private		Total
		Appropriated	Contracts & Grants		Profit	Non-Profit	
The University of Texas-Rio Grande Valley - Medical School	7,432,838	4,892,593	0	1,178,521	355,985	0	13,859,937
University of North Texas Health Science Center	27,162,599	6,065,011	2,410,593	4,950,798	2,721,289	1,268,382	44,578,672
Total for Public - Health-Related	\$758,960,125	\$339,305,734	\$137,586,614	\$230,488,140	\$159,943,868	\$374,275,702	\$2,000,560,183
Total for All Health-Related Institutions	\$1,026,809,023	\$343,128,376	\$160,927,467	\$409,096,701	\$183,686,225	\$418,606,635	\$2,542,254,427
Total	\$2,092,058,264	\$665,702,540	\$293,798,178	\$881,351,644	\$371,082,566	\$646,265,243	\$4,950,258,435

Source: Texas Higher Education Coordinating Board

Table 9. Federal R&D Expenditures/FTE Faculty Ratio, FY 2016 Texas Public Universities

	Federal R&D Expenditures	FTE Faculty*	Federal R&D Expenditures/FTE
Angelo State University	\$156,210	179.4	\$871
Lamar University	617,233	296.0	2,085
Midwestern State University	23,392	180.9	129
Prairie View A&M University	7,951,824	182.3	43,612
Sam Houston State University	1,821,123	392.3	4,642
Stephen F. Austin State University	1,630,211	378.0	4,312
Sul Ross State University	272,489	88.1	3,093
Tarleton State University	4,506,197	249.2	18,080
Texas A&M International University	929,392	132.5	7,013
Texas A&M University**	285,485,900	2014.2	141,740
Texas A&M University at Galveston	2,495,007	54.3	45,991
Texas A&M University-Central Texas	0	67.0	0
Texas A&M University-Commerce	878,486	237.2	3,704
Texas A&M University-Corpus Christi	8,668,947	197.5	43,902
Texas A&M University-Kingsville	7,477,173	223.4	33,474
Texas A&M University-San Antonio	128,580	71.3	1,805
Texas A&M University-Texarkana	77,830	59.1	1,317
Texas Southern University	3,378,395	246.0	13,732
Texas State University	21,049,270	484.9	43,406
Texas Tech University	32,404,692	975.4	33,223
Texas Woman's University	573,354	304.9	1,880
The University of Texas at Arlington	28,572,255	508.9	56,145
The University of Texas at Austin	357,166,877	1674.0	213,364
The University of Texas at Dallas	35,450,709	480.0	73,856
The University of Texas at El Paso	42,886,101	458.9	93,458
The University of Texas at San Antonio	24,899,939	574.0	43,377
The University of Texas at Tyler	363,719	204.7	1,777
The University of Texas of the Permian Basin	522,855	83.8	6,239
The University of Texas-Rio Grande Valley	9,429,050	400.1	23,570
University of Houston	59,614,128	899.6	66,269
University of Houston-Clear Lake	756,414	243.2	3,110
University of Houston-Downtown	1,688,143	218.0	7,744
University of Houston-Victoria	178,171	90.0	1,980
University of North Texas	12,620,150	534.5	23,612
University of North Texas at Dallas	23,385	35.3	663
West Texas A&M University	1,735,084	150.6	11,522
Totals	\$956,432,685	13,569.3	\$70,485

Source: Texas Higher Education Coordinating Board

* FTE Faculty indicates number of full-time equivalents (FTE) for tenured and tenure-track faculty with teaching responsibilities based on Fall 2015 (FY 2016) Coordinating Board Accountability System reports.

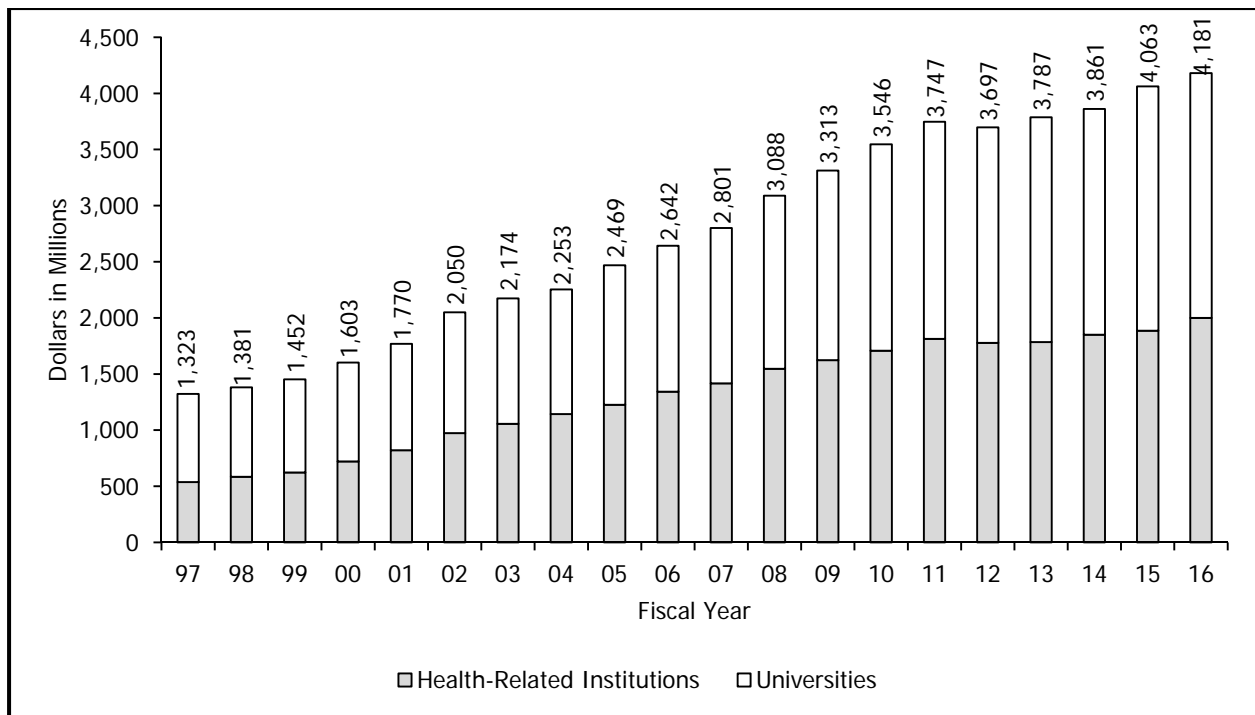
** FTE faculty for Texas A&M University is based on its FTE faculty plus faculty from Texas AgriLife and the Texas Engineering Experiment Station. Service agency counts come from Legislative Appropriations Requests for FY 2018 and 2019 include 126 FTEs from Texas AgriLife and 325.6 from Texas Engineering Experiment Station.

Historical Data for Public Institutions

Figure 4 presents total research development expenditures since 1997. The accelerated growth in research expenditures for the public health-related institutions from 1999 to 2003 was likely due to the doubling of the National Institutes of Health budget, a major source of research funding. Research expenditures declined in Fiscal Year 2012, but increased every year since.

From Fiscal Year 2015 to Fiscal Year 2016, research expenditures increased \$118.6 million (2.9%). By source of funds, the large percentage increase was due to a \$60.1 million increase in private funds (7.1%) and a \$40.4 million increase in state and local grants (4.6%). Health-related institutions increased by \$116.1 million and universities increased by \$2.5 million. The majority of the growth in research expenditures for the public institutions (65.3%) from Fiscal Year 2015 to Fiscal Year 2016 was due to an increase of \$21.2 million at Texas A&M University Health Science Center, \$27.2 million at The University of Texas Health Science Center at San Antonio, and \$29.0 million at The University of Texas Southwestern Medical Center.

Figure 4. Expenditures for Research and Development Texas Public Institutions of Higher Education FY 1997 – FY 2016



Source: Texas Higher Education Coordinating Board

National Indicators

National indicators are based on data provided by the National Science Foundation (NSF). Figures are not entirely consistent with data provided in earlier sections of this report because these statistics are based on a previous year and reporting requirements are somewhat different. One difference in the reporting requirements is the way the NSF survey allows institutions to calculate unreimbursed indirect costs. The Coordinating Board's survey allows only tracked indirect costs as reported in the institution's annual financial report. Thus, the NSF calculation will have a considerably higher total in the *Institution* source of funding (see <http://www.nsf.gov/statistics/profiles> to compare individual institutions) in comparison with the Coordinating Board reports. NSF may impute data for institutions that do not respond to or fully complete the survey, which is another difference in the reporting requirements.

In data collected by the NSF's Higher Education Research and Development Survey for Fiscal Year 2014, Texas (\$4.9 billion) ranked third among the states in total research expenditures in all fields, behind California (\$8.4 billion) and New York (\$5.6 billion). The NSF publishes several reports on research obligations and research expenditures. Two common approaches look at somewhat different information:

- Federally Financed Research and Development Expenditures in all Fields summarizes federal funds expenditures by higher education institutions that support research and development in any given year. This report is based on data reported by institutions and summarized by the NSF.

The top six states for Federally Financed Research and Development Expenditures in all Fields in Fiscal Year 2014 were:

- California: \$4.7 billion
 - New York: \$3.0 billion
 - Maryland: \$2.9 billion
 - Pennsylvania: \$2.2 billion
 - Massachusetts: \$2.1 billion
 - Texas: \$2.0 billion
- Federal Obligations for Research and Development in Science and Engineering includes only federal funds obligated during a year to support, directly or indirectly, basic and applied research and development in science and engineering disciplines at higher education institutions. Funds obligated in any given year may be expended over a number of years, so obligations differ from expenditures. The amount of support is reported by federal agencies.

The top six states for Federal Obligations for Research and Development in Science and Engineering in Fiscal Year 2014 were:

- California: \$3.9 billion
- New York: \$2.2 billion
- Maryland: \$1.8 billion
- Pennsylvania: \$1.7 billion
- Massachusetts: \$1.6 billion
- Texas: \$1.4 billion

Table 10 shows the ranking of the top 10 states in federal research and development expenditures in selected science and engineering fields for 2014. Texas ranked fourth in life sciences, seventh in engineering, fifth in physical sciences, and fourth in environmental sciences.

Table 10. Top 10 States in Federal Research and Development Expenditures Selected Science and Engineering Fields, FY 2014

Rank	Life Sciences	\$	Engineering	\$	Physical Sciences	\$	Environmental Sciences	\$
1	California	\$2.79	Maryland	995	California	558	California	233
2	New York	2.05	California	555	Maryland	255	Massachusetts	196
3	Pennsylvania	1.32	Massachusetts	447	Massachusetts	235	Colorado	183
4	Texas	1.19	Pennsylvania	401	New York	225	Texas	133
5	Maryland	1.13	Georgia	390	Texas	141	New York	116
6	North Carolina	1.12	New York	363	Michigan	126	Maryland	104
7	Massachusetts	937	Texas	320	Illinois	136	Washington	103
8	Ohio	855	Michigan	235	Pennsylvania	101	Florida	90
9	Illinois	809	Ohio	234	Arizona	117	Hawaii	63
10	Washington	648	Illinois	190	Colorado	104	Oregon	56

Source: National Science Foundation, WebCASPARD Database System, 12/27/2016
 Note: Dollars in Millions

Table 11 shows the ranking of the top 10 states in federal obligations for research and development in science and engineering, and federally financed research and development expenditures for all fields for 2014. Texas ranks sixth in federal obligations for research and development in science and engineering, and ranks sixth in research and development expenditures in all fields from federal sources as well.

Table 11. State Rank in Federal Obligations and Federally Financed Research & Development, FY 2014

Rank	Federal Obligations for R&D in Science and Engineering to Colleges and Universities	\$	Federally Financed R&D Expenditures in All Fields at Colleges and Universities	\$
1	California	\$3,908	California	\$4,714
2	New York	2,222	New York	3,026
3	Maryland	1,819	Maryland	2,943
4	Pennsylvania	1,740	Pennsylvania	2,178
5	Massachusetts	1,566	Massachusetts	2,142
6	Texas	1,362	Texas	2,015
7	North Carolina	1,171	North Carolina	1,600
8	Michigan	1,126	Illinois	1,379
9	Illinois	1,069	Ohio	1,269
10	Georgia	753	Georgia	1,211

Source: National Science Foundation, WebCASPARD Database System, 3/17/2017
 Note: Dollars in Millions

Appendix – Instructions and Definitions for Survey

Texas Higher Education Coordinating Board Survey of Research Expenditures, FY 2016 Universities and Health-Related Institutions Instructions and Definitions for Survey

About This Survey

The Texas Higher Education Coordinating Board collects data from Texas higher education institutions annually through the Survey of Research Expenditures. Beginning in Fiscal Year 2010, the survey was issued as part of the Academic Sources and Uses Template. The collection of these data is mandated by the Texas Legislature. The data collected are published and accessible in an online report system (<http://www.thecb.state.tx.us/ResearchExpenditure>).

The figures from this survey are used by institutions of higher education and other state agencies. In addition, the data provides the basis for public policy and management decisions. Therefore, it is critical that the data reported are accurate and complete.

The information provided in the report should be consistent with the Annual Financial Report (AFR) of the institution. For additional information, please refer to College and University Business Administration, NACUBO.

The data collection form and definitions are modeled after similar forms used by the National Science Foundation. This approach is an effort to provide comparability of data with national data and reduce the data collection efforts of the institutions.

General Concepts and Definitions

A. Research and Development (R&D) activities are defined as follows:

1. Research is systematic study directed toward fuller scientific knowledge or understanding of the subject studied (reference OMB Circular A-110, subpart A, definition A.2dd).
2. Development is systematic use of knowledge or understanding gained from research, directed toward the production of useful materials, devices, systems, or methods including design and development of prototypes and processes (reference OMB Circular A-110, subpart A, definition A.2dd).

Research and Development (R&D) also includes activities involving the training of individuals in research techniques where such activities utilize the same facilities as other research and development activities and where such activities are not included in the instruction function (reference OMB Circular A-21, B.1.b).

Exclusions from research and development:

- Training of scientific personnel
- Mapping and surveys
- Routine product testing
- Quality Control
- Experimental production
- Collection of general purpose statistics (statistics not collected as part of a specific R&D project)

NOTE: Certain activities may or may not be classified as research and development depending upon circumstances. Examples of such activities are given below in section B, Reporting Guidelines for R&D versus Non-R&D Activities.

B. Selected financial terms

Fiscal Year - The 12-month accounting period ending August 31 of each year.

Expenditures - All amounts of money paid out by your institution to support R&D activities. Include funds "passed through" to other institutions of higher education. Include earned indirect costs and fringe benefits. Do not include non-monetary awards.

Federal Funds - All Federal monies used in support of the R&D activities of your institution. These include reimbursements, contracts, grants, and any identifiable amounts spent from Federal programs including Federal monies passed through state agencies.

State Sources - Include all expenditures of funds appropriated by the State of Texas not included in institutionally controlled funds listed in paragraph 5 below. Included in this category are state appropriated "Special Items" and state contracts and grants such as NHARP and ATP funds, interagency contracts, contracts with Texas local governments, etc.

Institution Resources - Include expenditures of funds that are locally controlled. This would include PUF and AUF funds, other local funds, etc.

Private - Include expenditures of funds from both for-profit and non-profit corporations and individuals. Also, include in this category funds from agencies from other states.

Definitions for Specific Items

Total R&D Expenditures - Defined For Survey - All expenditures except those for R&D plant.

Capital outlay for research equipment

As a result of recent changes adopted by the Government Accounting Standards Board, annual financial reports will report expenses rather than expenditures. The major difference is that capital outlays for research equipment will be depreciated over the life of the equipment and will not be separately identified as research items in the annual financial reports. This line allows inclusion of expenditures for equipment that are not included in research expenses. The research definition used

for this report does not allow inclusion of expenses for R&D plant or construction.

R&D Expenses not meeting the narrow definition of R&D used in the Research Expenditure Survey. Externally-funded activities that cannot be classified as R&D using the definitions appearing in A, above, are included. Do not include projects funded with "development" funds unless they are related to research activities.

Reporting Guidelines for R&D versus Non-R&D Activities:

Economic studies - To be classified as research, the activities under this heading should be systematic and intensive. They should not include program planning, implementation, and evaluation unless these activities are designed as a fairly rigorous research effort. For example, a study to determine the impact of proposed tax changes on State revenues, or on Statewide employment, consumption, or industrial output could be reported as economic research. But the collection of economic data on tax revenues, personal income, or industrial output would be reported as economic research only if collected as part of the research project.

Evaluation - Evaluation qualifies as research when it is part of a specific research undertaking. Evaluation conducted separately from a research project is considered research when it involves scientific method and hypothesis testing procedures with fairly rigorous standards. Evaluation activities that do not involve systematic design and testing should not be included.

Demonstration - Demonstration activities that are part of research or development (i.e., that are intended to prove or to test whether a technology or method does, in fact, work) should be included. Demonstration intended to make available information about new technologies or methods should not be included. For example, an educational demonstration on new teaching methods should be reported as an R&D activity if the demonstration is established as an experiment to produce new information, is accomplished within a definite time period, and is accompanied by a thorough evaluation. An educational demonstration to apply or exhibit new teaching methods, or a demonstration without a scheduled termination or a thorough evaluation, should not be reported as an R&D activity.

Collection of statistical data - The collection of statistics is an R&D activity only if conducted as part of a specific research or development program. For example, the regular collection and publication of statistics on the incidence of various diseases within a State by a State health department is general purpose data collection and not research or development. The data gathering is not part of a research program and is designed for use by a range of persons, such as practicing physicians, public health officials, and school officials. If the data on incidence of diseases are gathered as part of a project on the origin and nature of particular diseases, however, or to establish generalizations on why certain individuals or groups contract certain diseases, this would be research.

Satellite information - Photographs and tapes purchased from Federal agencies (or others) sponsoring satellite operations are not considered research and development unless they are used primarily in support of a research or development program. Tapes and photographs that are stored in documentation centers or used primarily for the formulation of regulations are excluded from this survey.

Technology transfer - Technology transfer involves the adoption, and perhaps adaptation, of new techniques or products that have already been brought to a usable condition. The adoption and use of a technology is not research and development, but the adaptation of a technology to meet unique regional or local needs could involve R&D activities. For example, a new method of treating water to make it potable is developed in one State. If another State adopts the same treatment process, the adoption costs for facilities, equipment, personnel, etc., are not R&D expenditures. However, if further systematic, intensive study is required by the second State to modify the treatment process to adapt it to unique local conditions, the costs of modification and adaptation could be R&D expenditures.

Agricultural sciences deal with the production of food and fiber. They include work in plant sciences, animal sciences, aquaculture, agricultural economics, and other topics related to the agricultural enterprise.

Biological sciences are those life sciences (apart from medical sciences and agricultural sciences described above) that deal with the origin, development, structure, function, and interaction of living things. Examples of biological sciences are as follows: anatomy; animal sciences; bacteriology; biochemistry; biogeography; biophysics; ecology; embryology; entomology; evolutionary biology; genetics; immunology; microbiology; molecular biology; nutrition and metabolism; parasitology; pathology; pharmacology; physical anthropology; physiology; plant sciences; radiobiology; systematics.

Computer science is concerned with the application of mathematical methods to automated information systems, the development of computer technology, and advanced applications of computers.

Engineering is concerned with studies directed toward developing engineering principles or toward making specific principles usable in engineering practice. Engineering fields include aeronautical, astronautical, chemical, civil, electrical, mechanical, metallurgy and materials, and engineering not elsewhere classified, such as agricultural, bioengineering, biomedical, industrial, nuclear, ocean and systems.

Environmental sciences (terrestrial and extraterrestrial) are concerned with the gross, non-biological properties (with one exception) of the areas of the solar system that directly or indirectly affect man's survival and welfare. They comprise the fields of atmospheric sciences, geological sciences, and oceanography. The one exception is that expenditures for studies pertaining to life in the sea or other bodies of water are to be reported as support of oceanography and not biology.

Mathematical sciences employ logical reasoning with the aid of symbols and are concerned with the development of methods of operation employing such symbols.

Medical sciences are concerned with the causes, effects, prevention, or control of abnormal conditions in man or his environment as they relate to health. Included are the clinical medical sciences, which are concerned with the study of the origins, diagnosis, or treatment of a particular disease in living human subjects under controlled conditions, and other medical sciences. Examples of the medical sciences are as follows: internal medicine; neurology; ophthalmology; preventive medicine and public health; psychiatry; radiology; surgery;

veterinary medicine; dentistry; physical medicine and rehabilitation; podiatry.

Physical sciences are concerned with the understanding of the material universe and its phenomena. They comprise the fields of astronomy, chemistry; physics, and physical sciences not elsewhere classified.

Psychology deals with behavior, mental processes, and individual and group characteristics and abilities. Examples of disciplines within psychology are as follows: experimental psychology; animal behavior; clinical psychology; comparative psychology; ethnology; social psychology; educational personnel, vocational psychology and testing; industrial and engineering psychology; development and personality.

Social sciences are directed toward an understanding of the behavior of social institutions and groups and of individuals as members of a group. These include anthropology, economics, history, linguistics, political sciences, and sociology.

Other sciences not elsewhere classified is a category to be used for multidisciplinary and interdisciplinary projects and cannot be classified within one of the broad fields of science listed above.

Arts and humanities include topics such as art, music, history, languages, religion, and other aspects of man's culture and heritage.

Business administration deals with the management and operation of business enterprises. It includes work in management, marketing, accounting, and related topics.

Education includes research related to any aspect of education. This includes elementary, secondary, and higher education; educational policy; education administration; etc.

Law and public administration includes research related to legal systems and to public policy at the federal, state, or local levels.

Other non-science activities should include all non-science disciplines not appropriately categorized above.

Areas of Special Interest - This section is intended to provide information on expenditures in areas of special interest to the public. The list is not all-inclusive. The totals of the Areas of Special Interest will not normally be equal to the "Total Expenditures for Conduct of R&D". Further, expenditures may overlap two or more categories (e.g., a given project may be reported both as materials science and microelectronics or as aging and mental health). Institutions may need to use ad hoc estimators to come up with these numbers.

Human embryonic stem cell research and adult stem cell research were added to the areas of special interest section beginning in FY 2013.

Pass Throughs - Determines the amounts of expenditures your institution received as a subrecipient and passed through to subrecipients.



This document and previous editions of Research Expenditures are available on the Texas Higher Education Coordinating Board website: <http://www.thecb.state.tx.us>

National level reports and statistics are available from the National Science Foundation at: <http://www.nsf.gov/statistics/> and <https://ncesdata.nsf.gov/webcaspar/>

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