



UNIVERSITY OF MASSACHUSETTS ANNUAL RESEARCH AND DEVELOPMENT EXPENDITURES REPORT

FY 2016

*UNIVERSITY OF MASSACHUSETTS PRESIDENTS OFFICE
OFFICE OF INSTITUTIONAL RESEARCH
FEBRUARY 2017*



University of Massachusetts

Amherst • Boston • Dartmouth • Lowell • Medical School • UMassOnline

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LIFE SCIENCES R&D EXPENDITURES

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Introduction

The *FY 2016 Annual Research and Development Expenditures Report* presents information on the research and development expenditures for the University of Massachusetts System. This report is based on data that our five UMass campuses and the UMass President's Office provide to the National Science Foundation (NSF) through its Higher Education Research and Development Survey (previously known as the annual Survey of Research and Development Expenditures at Universities and Colleges). In addition to the FY2016 data, this report also provides trend data in many cases. All comparison data presented in this report are sourced from the NSF HERD Data tables. These tables can be found at <http://ncesdata.nsf.gov/herd/2015/>.

The report is comprised of two sections: Total R&D Expenditures (pages 1-19) and Life Sciences R&D Expenditures (pages 20-22).

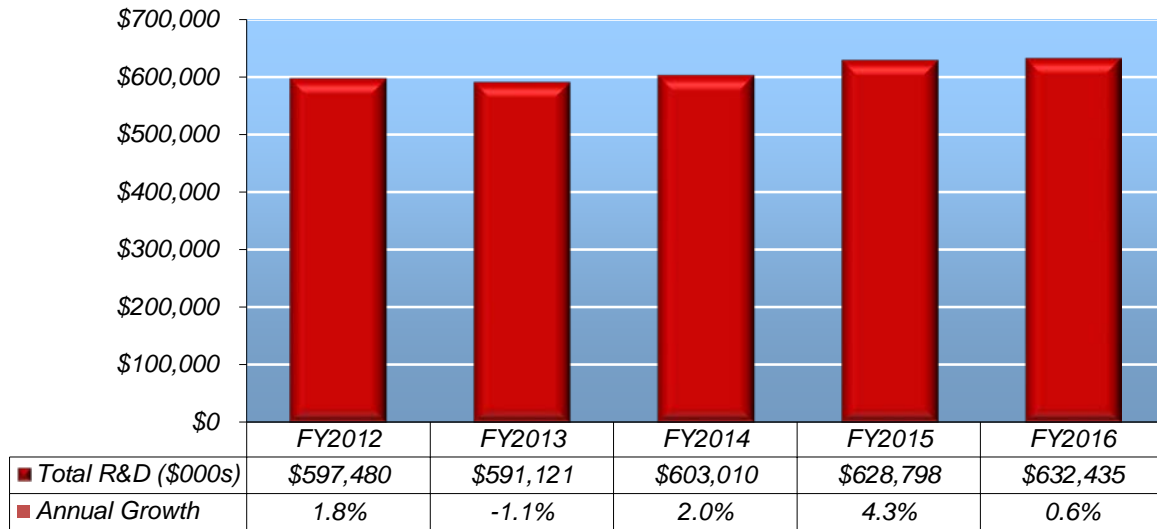
Major Highlights:

- **UMASS Total R&D Expenditures** – Total FY2016 R&D Expenditures for the University of Massachusetts System was reported at \$632.4 million, which represents a one percent increase from the FY2015 total of \$628.8 million.
- **Growth in Total R&D Expenditures (UMASS versus All U.S. Institutions)** – In FY2015 (most recent comparison data available), while Total R&D Expenditures for the UMass system reflected a 4.3 percent increase over the previous year, All U.S. Institutions reflected a growth rate of 2.2 percent.
- **UMASS R&D Expenditures in Science and Engineering** – In FY2016, an estimated \$566.7 million (90%) of our R&D expenditures were in sciences and engineering (S&E).
- **UMASS State Ranking in Total R&D Expenditures** – Among Massachusetts' colleges and universities, UMass ranked 3rd in Total R&D Expenditures, behind only MIT and Harvard. In FY 2015, UMass comprised nearly one-fifth (17%) of the Total Expenditures of all MA institutions. UMass, MIT, Harvard and BU together account for 81% of the academic science and engineering R&D expenditures in the state (Rankings based on FY2015 data).
- **UMASS R&D Expenditures by Funding Source (FY2016)** – In terms of funding sources, 56% is from the federal government, 27% is from institutional sources, 6% is from state and local government, 4% from businesses, 5% from non-profit organizations, and 1% is from other sources (e.g., private foundations).
- **UMASS Areas of Funding Growth** – Between the reporting cycles FY2015-16, industry/business sponsorship remained steady at 9%, and institutional funds dropped by one percent to 27%. State and local government funding also dropped by one percent, from 7% to 6% of all funds. Federal funding dropped from 57% to 56% of all funds.
- **Life Sciences Continues to Comprise More Than Half of all R&D Expenditures at UMass** – At \$365.5 million, the life sciences constitute more than half of UMass's total R&D expenditures (57.8%). FY2015 distribution of R&D expenditures by field is:

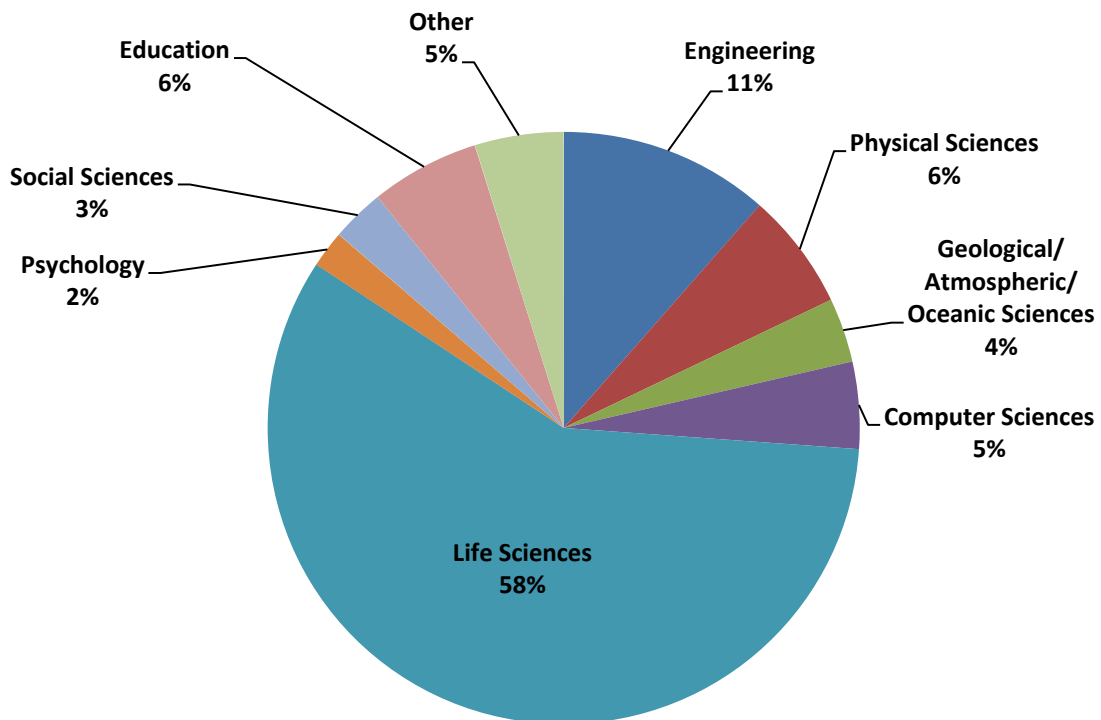
Life Sciences	57.8%	Social Sciences	2.9%
Physical Sciences	6.4%	Non-Science and Engineering	10.4%
Engineering	11.4%	Psychology	2.0%
Computer Sciences	4.7%	Mathematical Sciences	0.6%
Geo/Atm./Oceanic Sc.	3.5%	Other Sciences	0.3%

UMASS System

Total R&D Expenditures FY2012 - FY2016

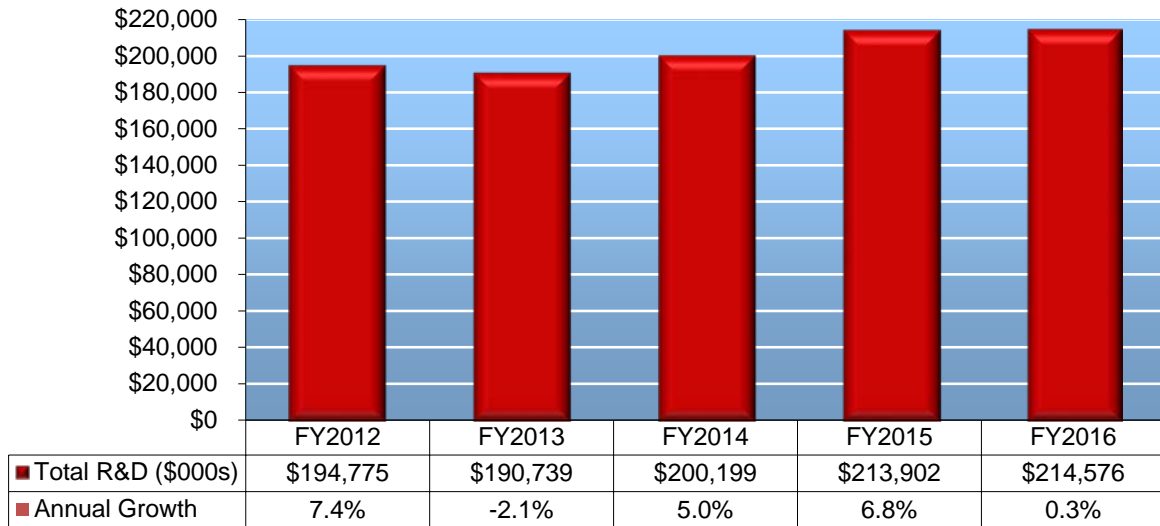


Total R&D Expenditures FY2016

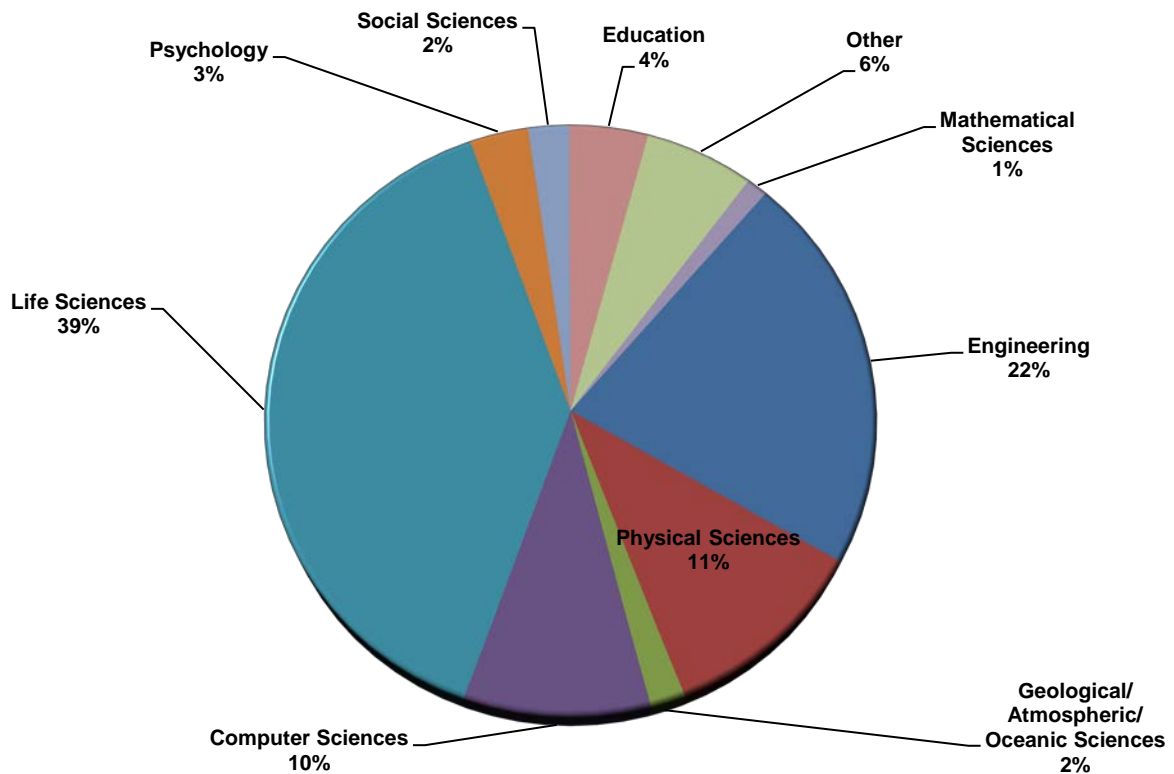


Amherst

Total R&D Expenditures FY2012- FY2016

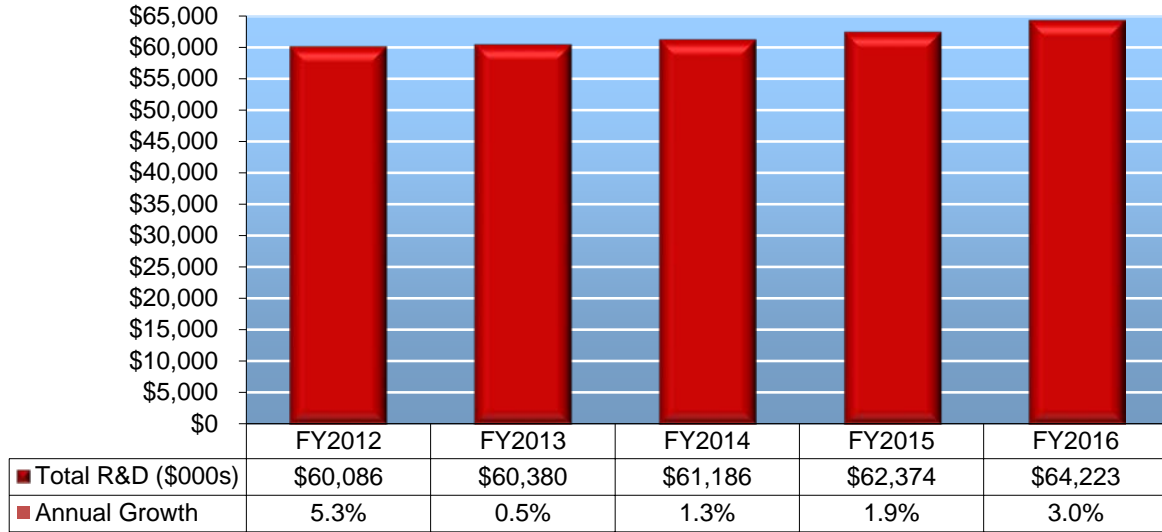


Total R&D Expenditures FY2016

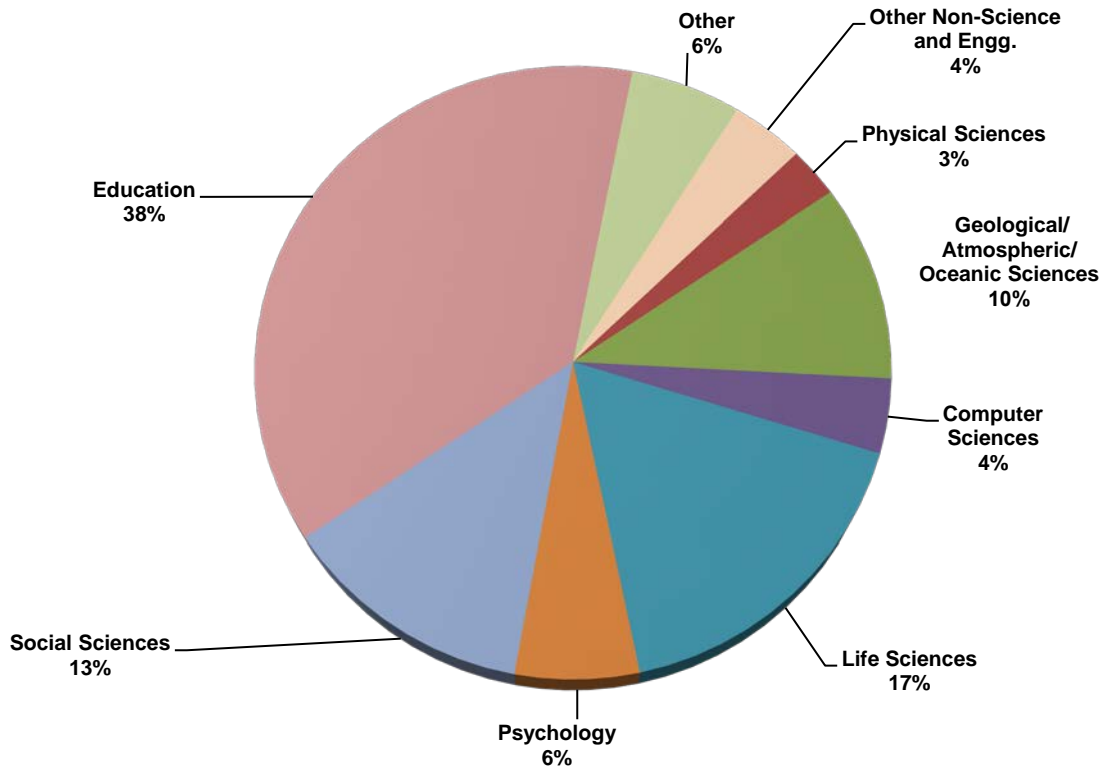


Boston

Total R&D Expenditures FY2012 - FY2016

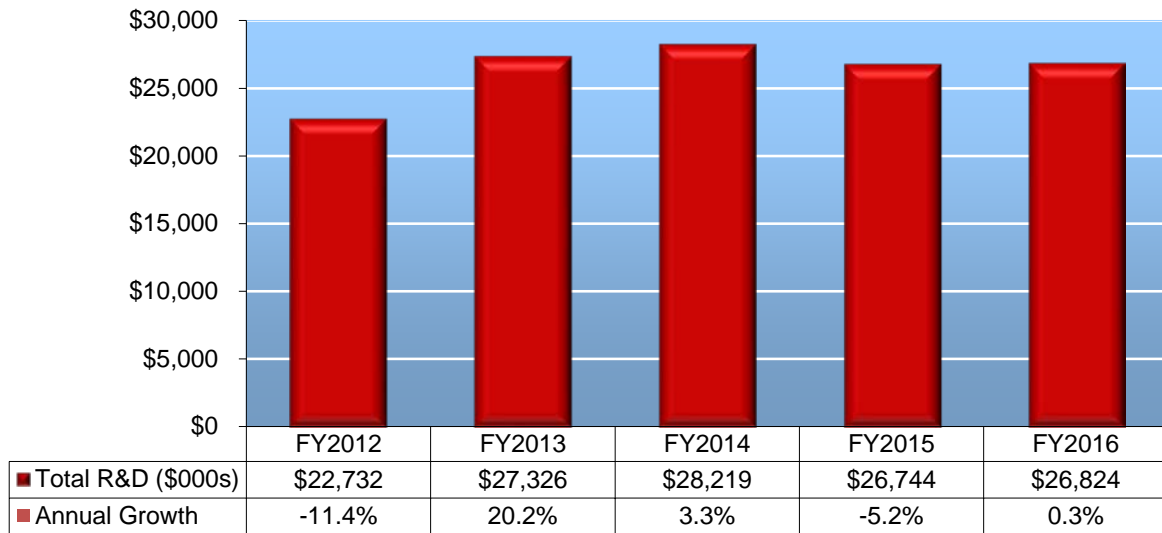


Total R&D Expenditures FY2016

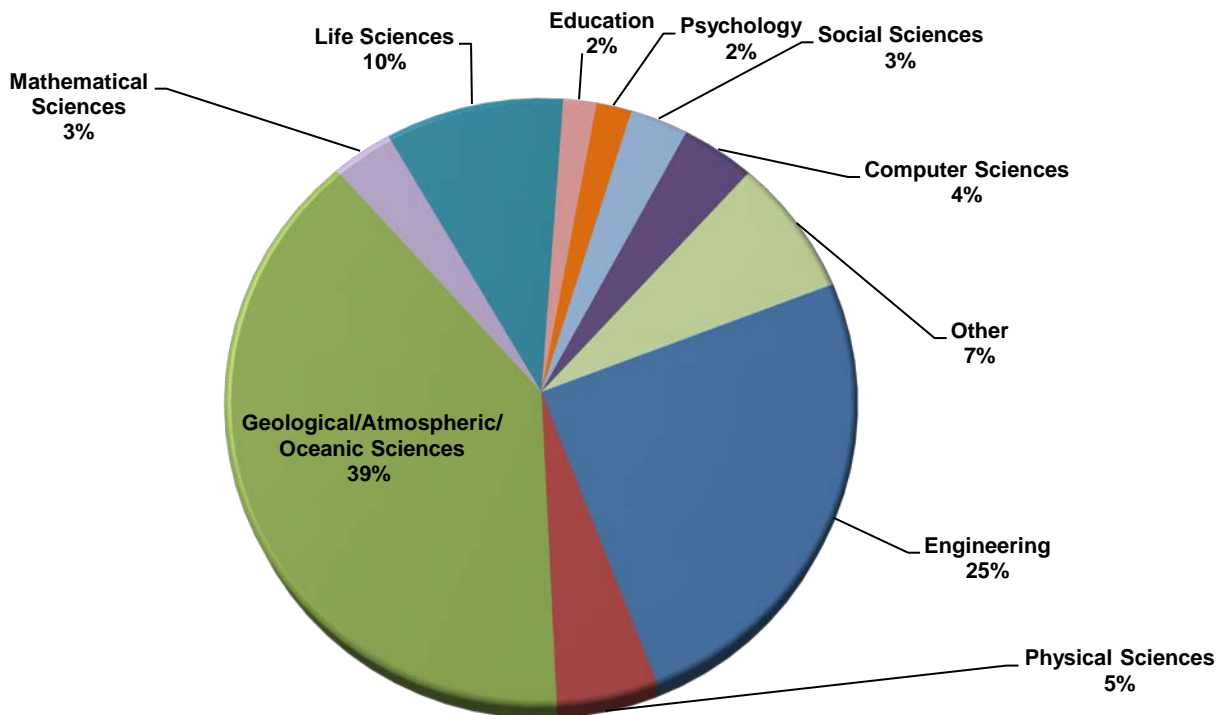


Dartmouth

Total R&D Expenditures FY2012 - FY2016

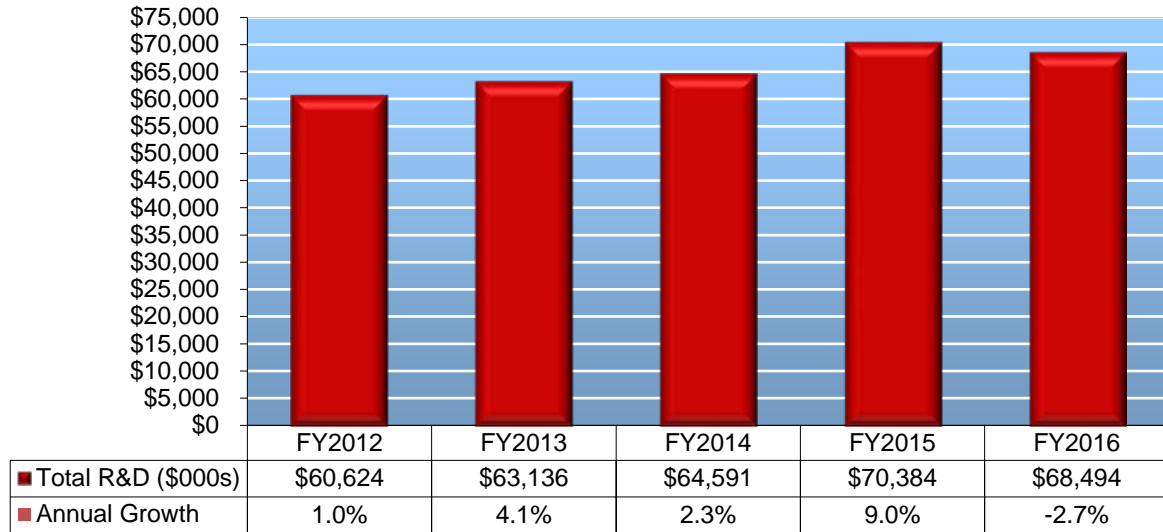


Total R&D Expenditures FY2016

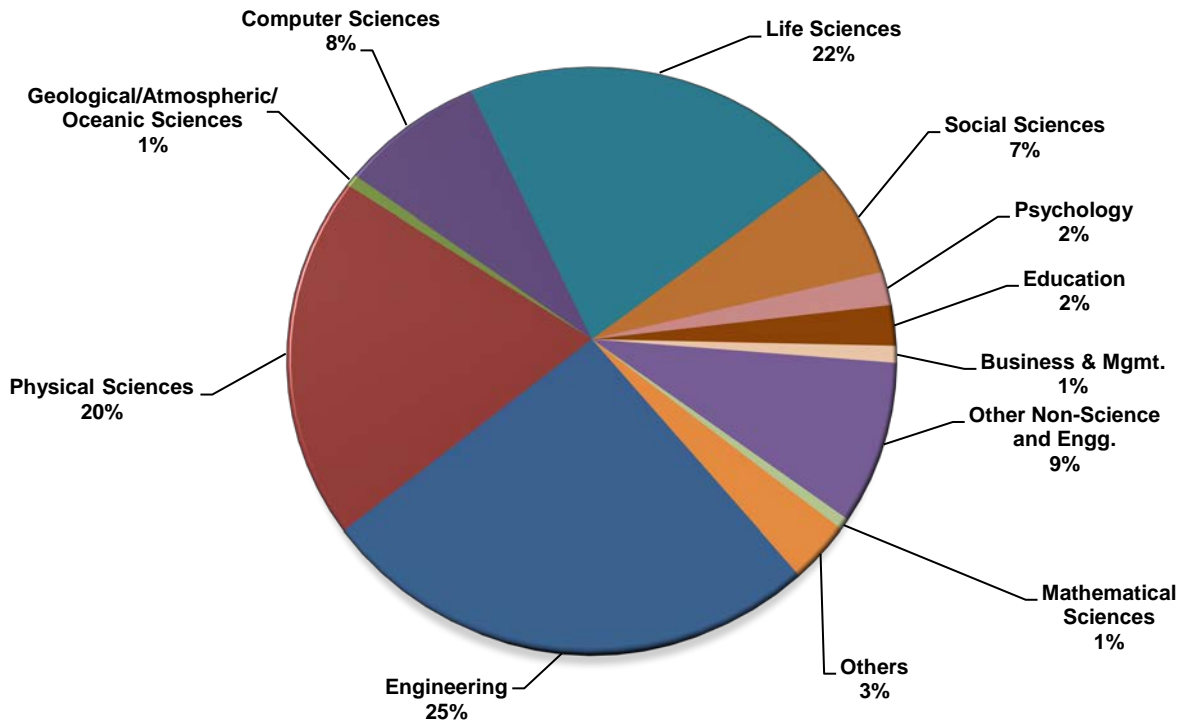


Lowell

Total R&D Expenditures FY2012 - FY2016

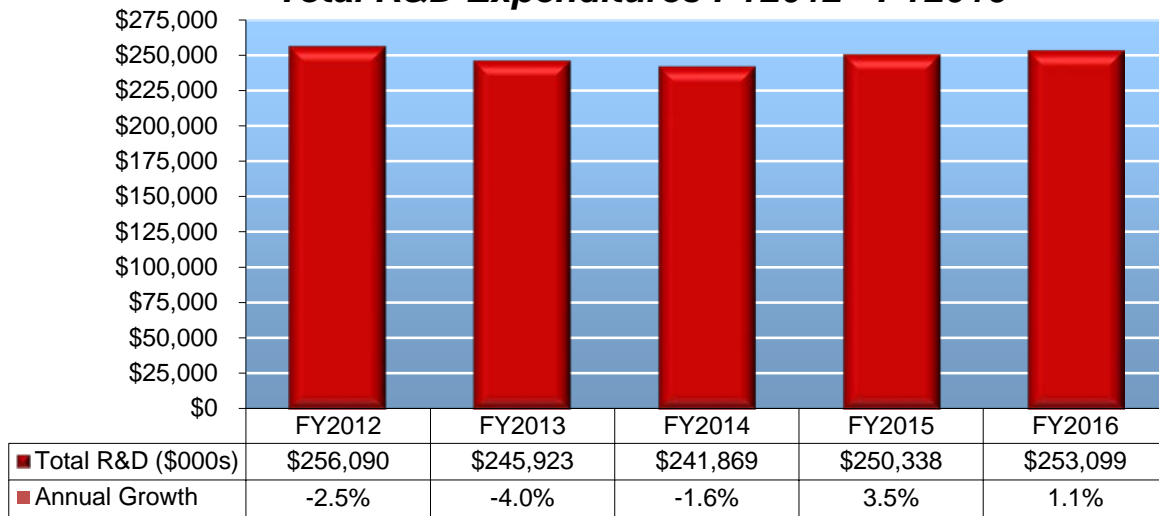


Total R&D Expenditures FY2016



Medical School

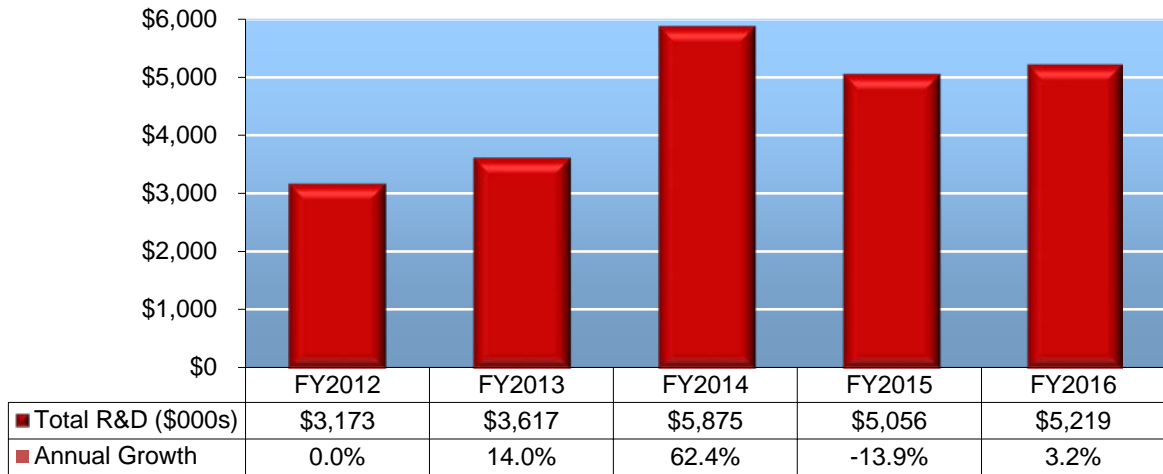
Total R&D Expenditures FY2012 - FY2016



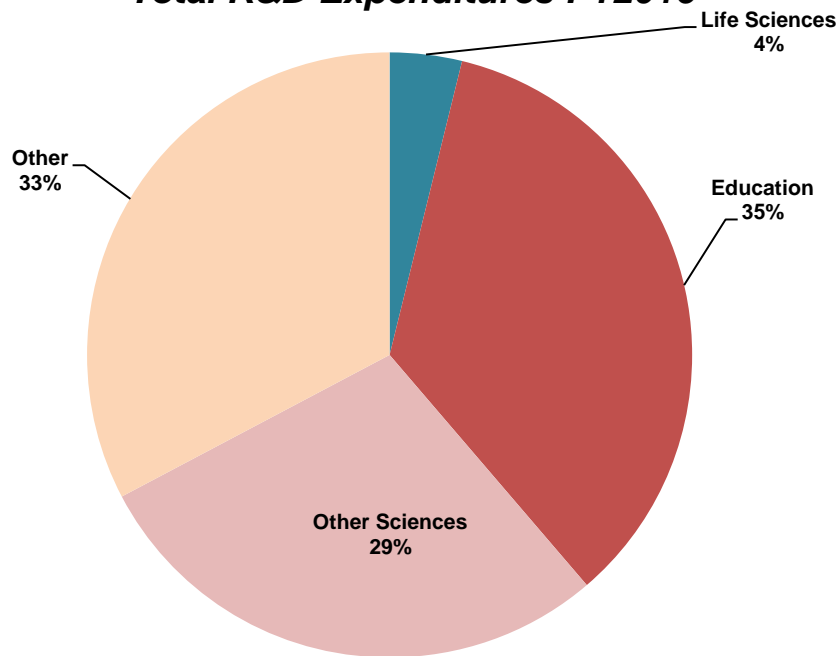
All of the Medical School's R&D expenditures are in the Life Sciences.

President's Office

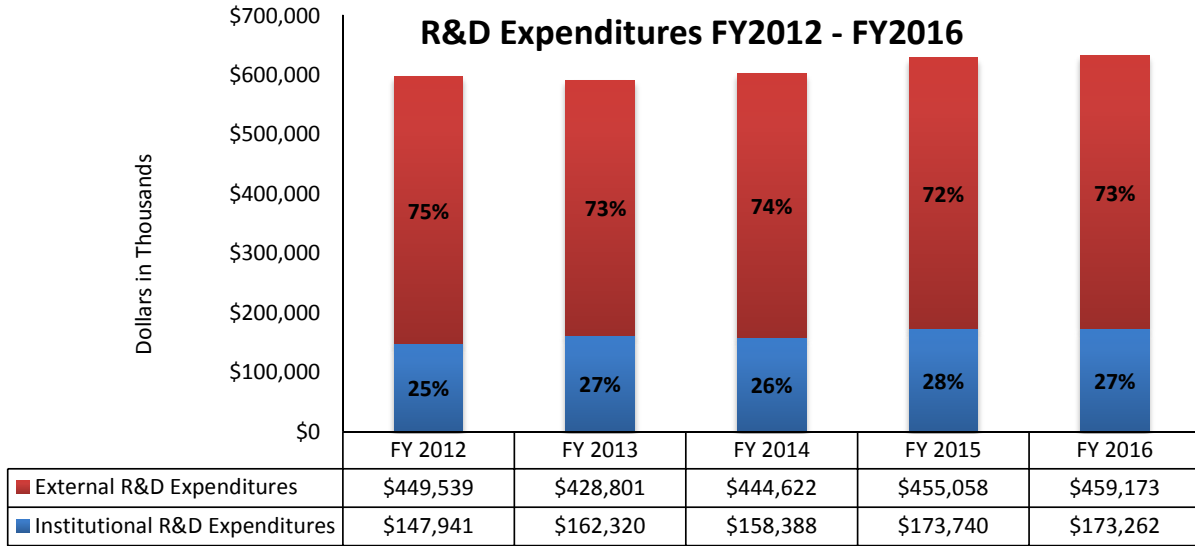
Total R&D Expenditures FY2012 - FY2016



President's Office Total R&D Expenditures FY2016

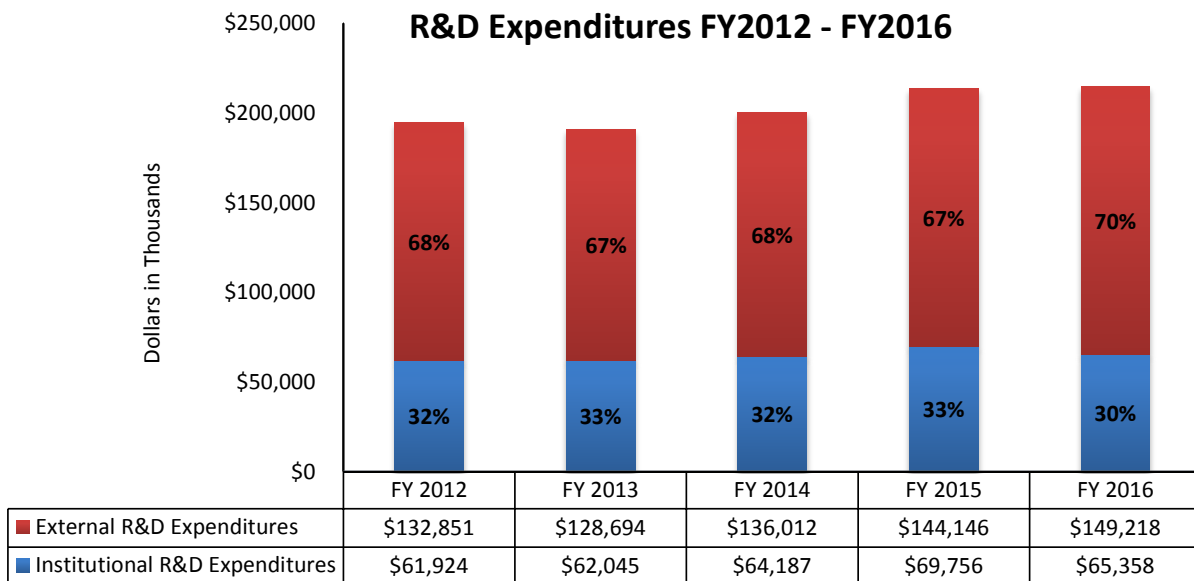


UMASS System External vs. Institutional



UMASS (\$000's)	FY2012 - FY2016 Total R&D Expenditures (Institutional vs. External Sources)				
	Institutional R&D Expenditures	External R&D Expenditures	Total R&D Expenditures	% Institutional	% External
FY 2012	\$147,941	\$449,539	\$597,480	25%	75%
FY 2013	\$162,320	\$428,801	\$591,121	27%	73%
FY 2014	\$158,388	\$444,622	\$603,010	26%	74%
FY 2015	\$173,740	\$455,058	\$628,798	28%	72%
FY 2016	\$173,262	\$459,173	\$632,435	27%	73%

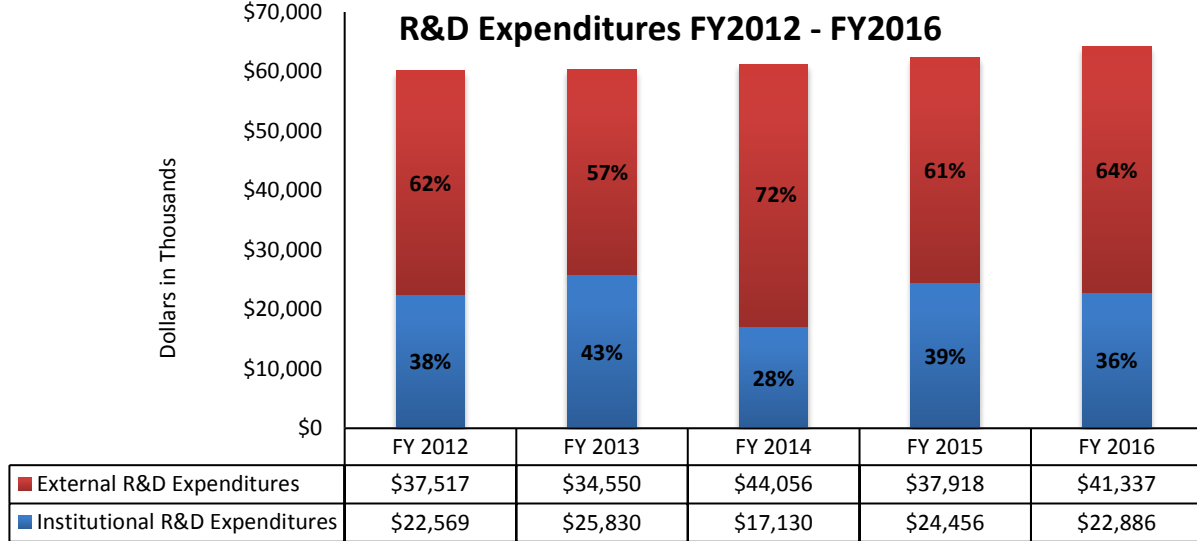
Amherst External vs. Institutional



UMASS AMHERST (\$000's)	FY2012 - FY2016 Total R&D Expenditures (Institutional vs. External Sources)				
	Institutional R&D Expenditures	External R&D Expenditures	Total R&D Expenditures	% Institutional	% External
FY 2012	\$61,924	\$132,851	\$194,775	32%	68%
FY 2013	\$62,045	\$128,694	\$190,739	33%	67%
FY 2014	\$64,187	\$136,012	\$200,199	32%	68%
FY 2015	\$69,756	\$144,146	\$213,902	33%	67%
FY 2016	\$65,358	\$149,218	\$214,576	30%	70%

Boston

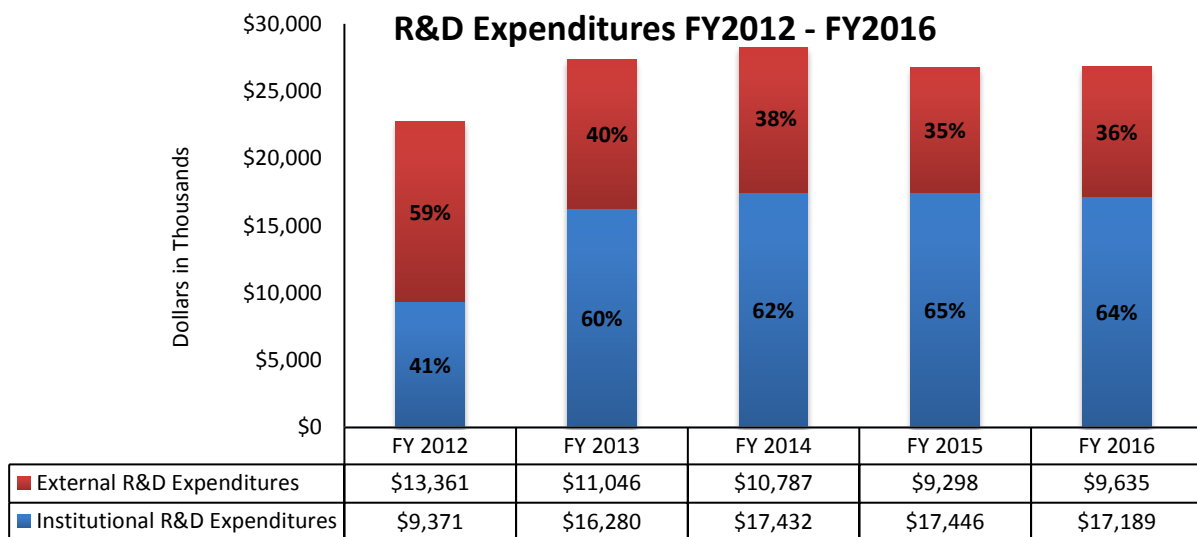
External vs. Institutional



UMASS BOSTON (\$000's)	FY2012 - FY2016 Total R&D Expenditures (Institutional vs. External Sources)				
	Institutional R&D Expenditures	External R&D Expenditures	Total R&D Expenditures	% Institutional	% External
FY 2012	\$22,569	\$37,517	\$60,086	38%	62%
FY 2013	\$25,830	\$34,550	\$60,380	43%	57%
FY 2014	\$17,130	\$44,056	\$61,186	28%	72%
FY 2015	\$24,456	\$37,918	\$62,374	39%	61%
FY 2016	\$22,886	\$41,337	\$64,223	36%	64%

Dartmouth

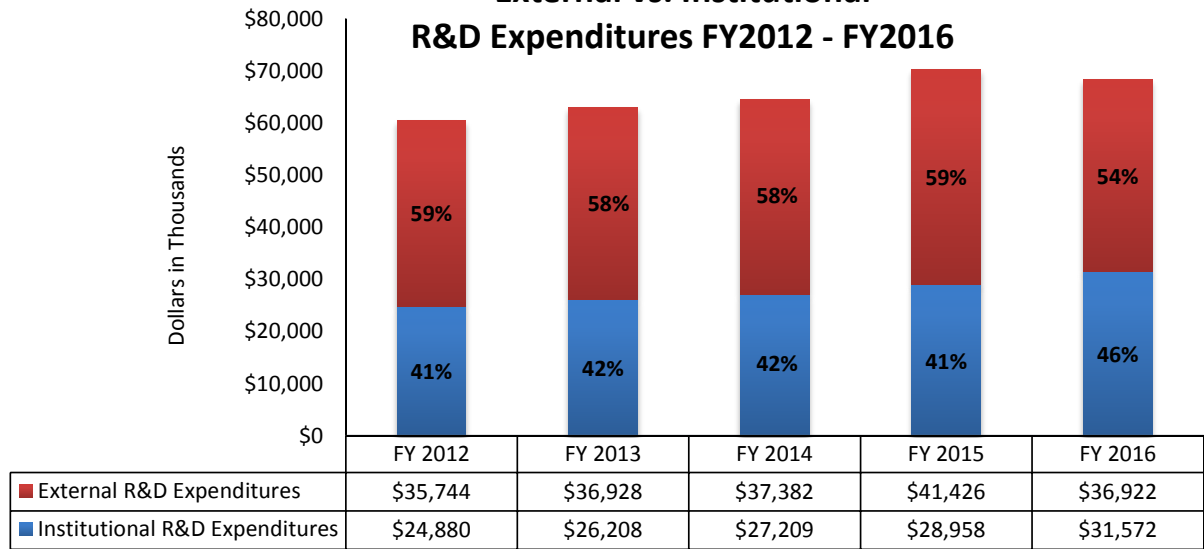
External vs. Institutional



UMASS DARTMOUTH (\$000's)	FY2012 - FY2016 Total R&D Expenditures (Institutional vs. External Sources)				
	Institutional R&D Expenditures	External R&D Expenditures	Total R&D Expenditures	% Institutional	% External
FY 2012	\$9,371	\$13,361	\$22,732	41%	59%
FY 2013	\$16,280	\$11,046	\$27,326	60%	40%
FY 2014	\$17,432	\$10,787	\$28,219	62%	38%
FY 2015	\$17,446	\$9,298	\$26,744	65%	35%
FY 2016	\$17,189	\$9,635	\$26,824	64%	36%

Lowell

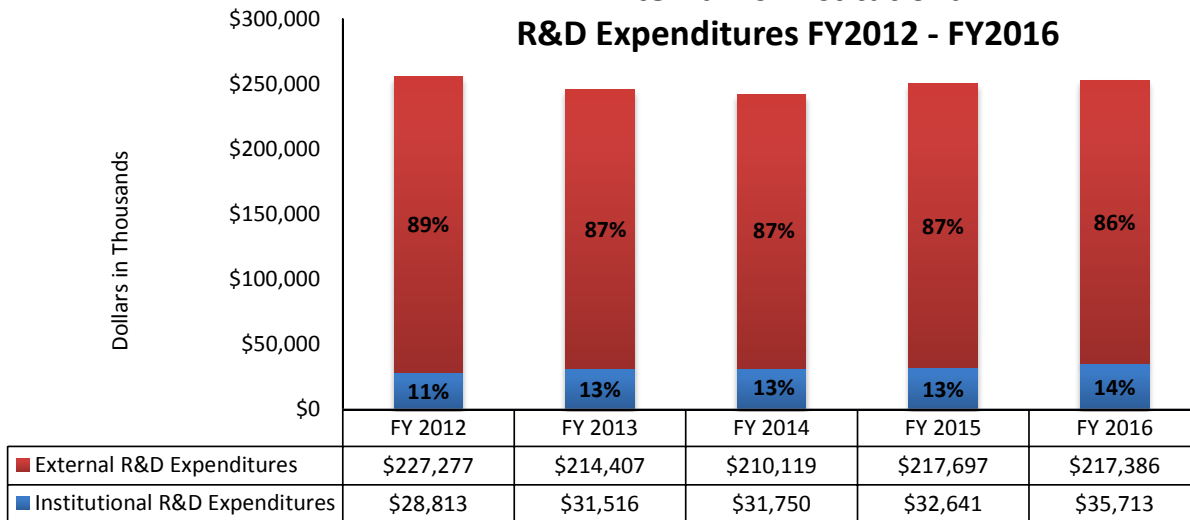
External vs. Institutional R&D Expenditures FY2012 - FY2016



UMASS LOWELL (\$000's)	FY2012 - FY2016 Total R&D Expenditures (Institutional vs. External Sources)				
	Institutional R&D Expenditures	External R&D Expenditures	Total R&D Expenditures	% Institutional	% External
FY 2012	\$24,880	\$35,744	\$60,624	41%	59%
FY 2013	\$26,208	\$36,928	\$63,136	42%	58%
FY 2014	\$27,209	\$37,382	\$64,591	42%	58%
FY 2015	\$28,958	\$41,426	\$70,384	41%	59%
FY 2016	\$31,572	\$36,922	\$68,494	46%	54%

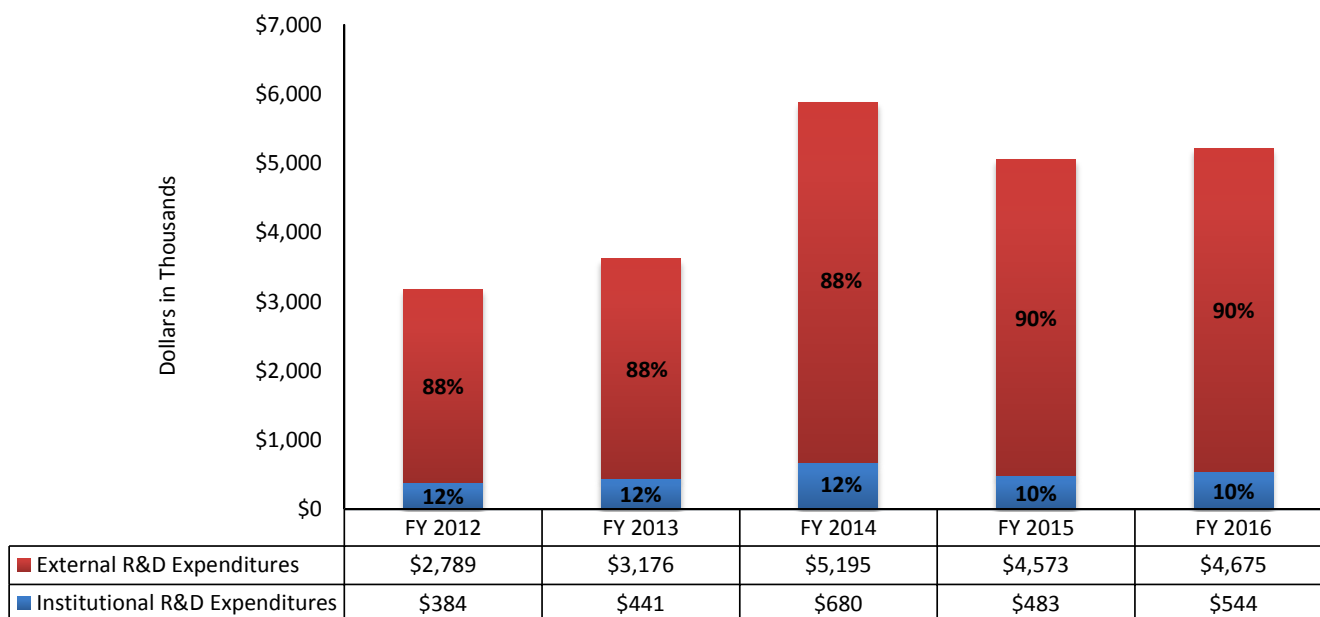
Medical School

External vs. Institutional R&D Expenditures FY2012 - FY2016



UMASS MEDICAL SCHOOL (\$000's)	FY2012 - FY2016 Total R&D Expenditures (Institutional vs. External Sources)				
	Institutional R&D Expenditures	External R&D Expenditures	Total R&D Expenditures	% Institutional	% External
FY 2012	\$28,813	\$227,277	\$256,090	11%	89%
FY 2013	\$31,516	\$214,407	\$245,923	13%	87%
FY 2014	\$31,750	\$210,119	\$241,869	13%	87%
FY 2015	\$32,641	\$217,697	\$250,338	13%	87%
FY 2016	\$35,713	\$217,386	\$253,099	14%	86%

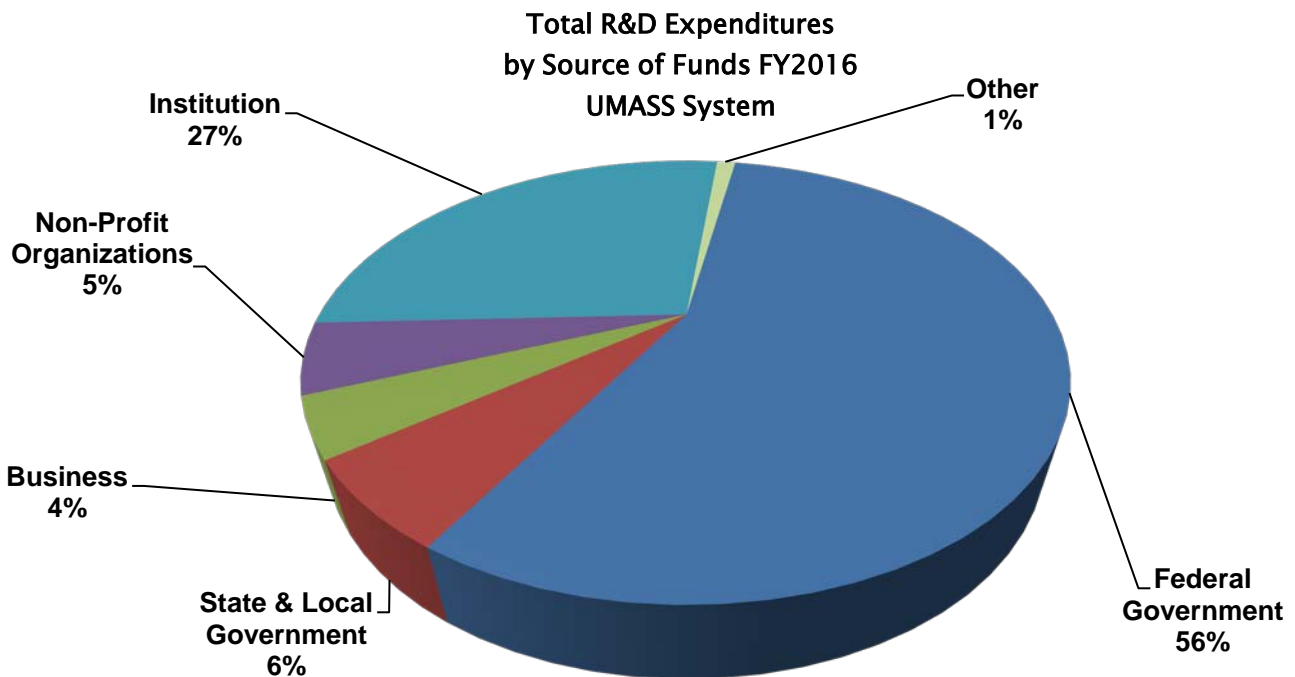
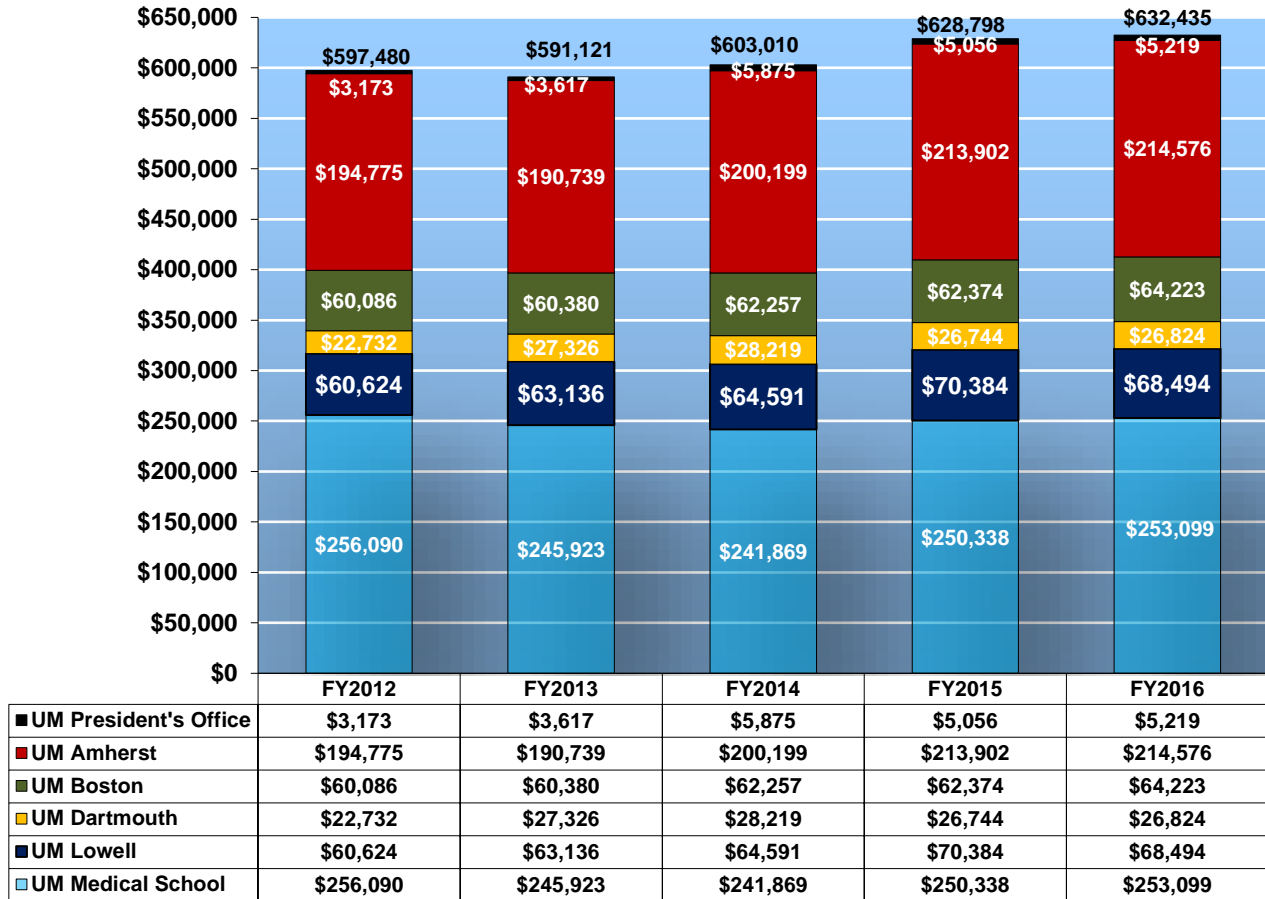
President's Office
External vs. Institutional
R&D Expenditures FY2012 - FY2016



UMASS PRESIDENTS OFFICE (\$000's)	FY2012 - FY2016 Total R&D Expenditures (Institutional vs. External Sources)				
	Institutional R&D Expenditures	External R&D Expenditures	Total R&D Expenditures	% Institutional	% External
FY 2012	\$384	\$2,789	\$3,173	12%	88%
FY 2013	\$441	\$3,176	\$3,617	12%	88%
FY 2014	\$680	\$5,195	\$5,875	12%	88%
FY 2015	\$483	\$4,573	\$5,056	10%	90%
FY 2016	\$544	\$4,675	\$5,219	10%	90%

Note: External R&D expenditures include all other sources of R&D expenditures reported in the NSF HERD survey (Federal, State and Local, Business and Non-Profit, Other), excluding Institutional R&D expenditures.

Total R&D Expenditures UMASS System FY2012 – FY2016



Source: Campus NSF surveys. All dollars are in thousands.

R&D Expenditures by Source – Details

(Dollars in Thousands)

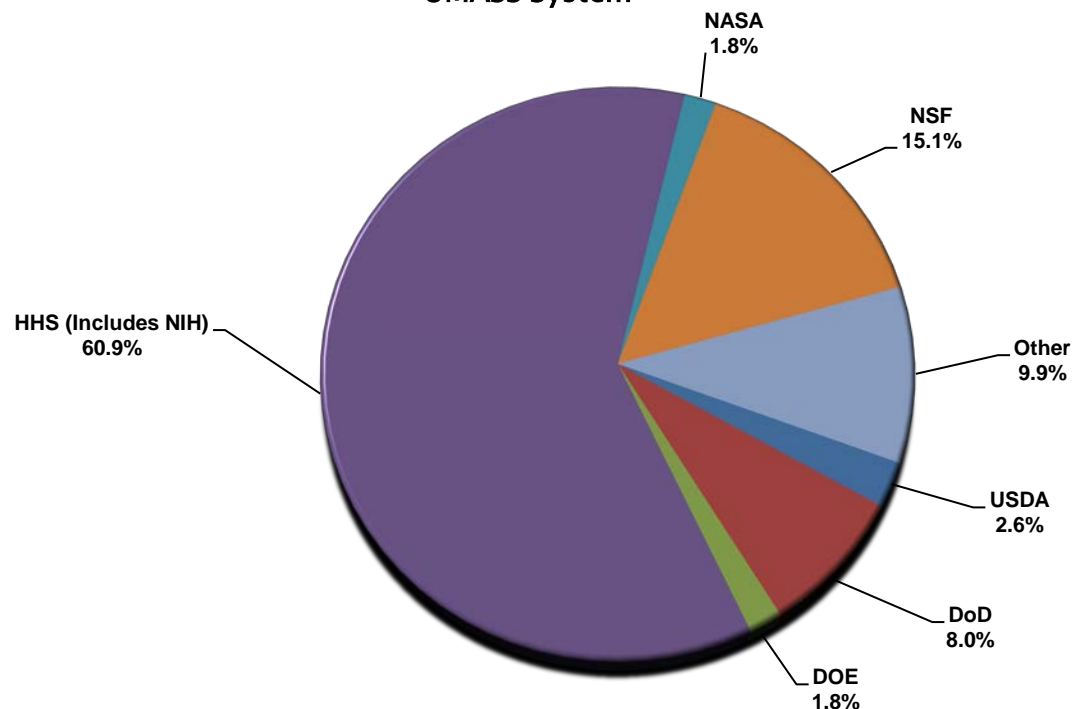
FY2012 - FY2016 Total R&D Expenditures									
	FY12	FY13	FY14	FY15	FY16	5-Year Change FY12-16		1-Year Change FY15-16	
						\$	%	\$	%
Amherst	\$194,775	\$190,739	\$200,199	\$213,902	\$214,576	\$19,801	10%	\$674	0%
Boston	\$60,086	\$60,380	\$61,186	\$62,374	\$64,223	\$4,137	7%	\$1,849	3%
Dartmouth	\$22,732	\$27,326	\$28,219	\$26,744	\$26,824	\$4,092	18%	\$80	0%
Lowell	\$60,624	\$63,136	\$64,591	\$70,384	\$68,494	\$7,870	13%	-\$1,890	-3%
Medical School	\$256,090	\$245,923	\$241,869	\$250,338	\$253,099	-\$2,991	-1%	\$2,761	1%
President's Office	\$3,173	\$3,617	\$5,875	\$5,056	\$5,219	\$2,046	64%	\$163	3%
System	\$597,480	\$591,121	\$601,939	\$628,798	\$632,435	\$34,955	6%	\$3,637	1%
FY2012 - FY2016 Federal Total R&D Expenditures									
	FY12	FY13	FY14	FY15	FY16	5-Year Change FY12-16		1-Year Change FY15-16	
						\$	%	\$	%
Amherst	\$115,280	\$111,448	\$110,189	\$103,417	\$106,269	-\$9,011	-8%	\$2,852	3%
Boston	\$33,275	\$24,924	\$27,715	\$28,653	\$30,608	-\$2,667	-8%	\$1,955	7%
Dartmouth	\$10,979	\$8,860	\$8,549	\$7,321	\$6,548	-\$4,431	-40%	-\$773	-11%
Lowell	\$26,786	\$27,360	\$28,654	\$31,059	\$27,694	\$908	3%	-\$3,365	-11%
Medical School	\$202,149	\$189,159	\$183,582	\$183,588	\$181,446	-\$20,703	-10%	-\$2,142	-1%
President's Office	\$1,655	\$2,126	\$3,468	\$1,445	\$1,124	-\$531	-32%	-\$321	-22%
System	\$390,124	\$363,877	\$362,157	\$355,483	\$353,689	-\$36,435	-9%	-\$1,794	-1%
FY2012 - FY2016 State & Local Total R&D Expenditures									
	FY12	FY13	FY14	FY15	FY16	5-Year Change FY12-16		1-Year Change FY15-16	
						\$	%	\$	%
Amherst	\$4,358	\$3,041	\$12,122	\$26,172	\$25,021	\$20,663	474%	-\$1,151	-4%
Boston	\$1,356	\$5,693	\$4,992	\$4,394	\$5,388	\$4,032	297%	\$994	23%
Dartmouth	\$1,313	\$1,462	\$1,742	\$1,327	\$1,864	\$551	42%	\$537	40%
Lowell	\$1,941	\$3,288	\$2,165	\$3,215	\$2,300	\$359	18%	-\$915	-28%
Medical School	\$1,101	\$804	\$564	\$4,615	\$1,646	\$545	50%	-\$2,969	-64%
President's Office	\$647	\$556	\$1,333	\$2,071	\$2,870	\$2,223	344%	\$799	39%
System	\$10,716	\$14,844	\$22,918	\$41,794	\$39,089	\$28,373	265%	(\$2,705)	-6%

Source: Campus NSF HERD surveys. All dollars are in thousands.

R&D Expenditures by Source – Details (Cont'd)

	FY2012- FY2016																			
	Industry-Sponsored Total R&D Expenditures																			
	FY12			FY13			FY14			FY15			FY16			5-Year Change FY12-16		1-Year Change FY15-16		
	Business	Non-Profits	Total	Business	Non-Profits	Total	Business	Non-Profits	Total	Business	Non-Profits	Total	Business	Non-Profits	Total	\$	%	\$	%	
Amherst	\$6,485	\$6,102	\$12,587	\$7,614	\$5,450	\$13,064	\$6,533	\$5,812	\$12,345	\$7,393	\$5,278	\$12,671	\$8,336	\$7,585	\$15,921	\$3,334	26.5%	\$3,250	26%	
Boston	\$160	\$2,670	\$2,830	\$97	\$3,219	\$3,316	\$721	\$2,867	\$3,588	\$1,499	\$2,991	\$4,490	\$1,291	\$3,616	\$4,907	\$2,077	73.4%	\$417	9%	
Dartmouth	\$519	\$334	\$853	\$425	\$208	\$633	\$180	\$274	\$454	\$365	\$201	\$566	\$831	\$205	\$1,036	\$183	21.5%	\$470	83%	
Lowell	\$3,914	\$2,983	\$6,897	\$4,303	\$1,115	\$5,418	\$3,921	\$1,569	\$5,490	\$4,634	\$1,568	\$6,202	\$4,775	\$1,322	\$6,097	-\$800	-11.6%	-\$105	-2%	
Medical School	\$9,749	\$14,278	\$24,027	\$8,795	\$14,948	\$23,743	\$6,925	\$16,349	\$23,274	\$9,452	\$17,609	\$27,061	\$11,483	\$19,789	\$31,272	\$7,245	30.2%	\$4,211	16%	
President's Office	\$60	\$427	\$487	\$19	\$418	\$437	\$8	\$360	\$368	\$221	\$814	\$1,035	\$180	\$476	\$656	\$169	34.7%	-\$379	-37%	
System	\$20,887	\$26,794	\$47,681	\$21,253	\$25,358	\$46,611	\$18,288	\$27,231	\$45,519	\$23,564	\$28,461	\$52,025	\$26,896	\$32,993	\$59,889	\$12,208	25.6%	\$7,864	15%	
	FY2012 - FY2016										FY2012 - FY2016									
	Institutional Total R&D Expenditures										Other Total R&D Expenditures									
	FY12	FY13	FY14	FY15	FY16	5-Year Change FY12-16		1-Year Change FY15-16		FY12	FY13	FY14	FY15	FY16	5-Year Change FY12-16		1-Year Change FY15-16			
					\$	%	\$	%						\$	%	\$	%			
Amherst	\$61,924	\$62,045	\$64,187	\$69,756	\$65,358	\$3,434	5.5%	-\$4,398	-6.3%	\$626	\$1,141	\$1,356	\$1,886	\$2,007	\$1,381	220.6%	\$121	6.4%		
Boston	\$22,569	\$25,830	\$17,130	\$24,456	\$22,886	\$317	1.4%	-\$1,570	-6.4%	\$56	\$617	\$311	\$381	\$434	\$378	675.0%	\$53	13.9%		
Dartmouth	\$9,371	\$16,280	\$17,432	\$17,446	\$17,189	\$7,818	83.4%	-\$257	-1.5%	\$216	\$91	\$42	\$84	\$187	-\$29	-13.4%	\$103	122.6%		
Lowell	\$24,880	\$26,208	\$27,209	\$28,958	\$31,572	\$6,692	26.9%	\$2,614	9.0%	\$120	\$862	\$1,073	\$950	\$831	\$711	592.5%	-\$119	-12.5%		
Medical School	\$28,813	\$31,516	\$31,750	\$32,641	\$35,713	\$6,900	23.9%	\$3,072	9.4%	\$0	\$701	\$2,699	\$2,433	\$3,022	\$3,022	na	\$589	24.2%		
President's Office	\$384	\$441	\$680	\$483	\$544	\$160	41.7%	\$61	12.6%	\$0	\$57	\$26	\$22	\$25	\$25	na	\$3	13.6%		
System	\$147,941	\$162,320	\$158,388	\$173,740	\$173,262	\$25,321	17.1%	-\$478	-0.3%	\$1,018	\$3,469	\$5,507	\$5,756	\$6,506	\$5,488	539.1%	\$750	13.0%		

**Total R&D Expenditures
by Federal Government Agency Sources FY2016
UMASS System**



	Total Federal \$	USDA	% of Campus Total	DoD	% of Campus Total	DOE	% of Campus Total	HHS (includes NIH)	% of Campus Total	NASA	% of Campus Total	NSF	% of Campus Total	Other	% of Campus Total
Amherst	\$106,269	\$8,948	8.4%	\$11,783	11.1%	\$5,232	4.9%	\$24,453	23.0%	\$3,239	3.0%	\$38,020	35.8%	\$14,594	13.7%
Boston	\$30,608	\$0	0.0%	\$789	2.6%	\$22	0.1%	\$9,909	32.4%	\$1,567	5.1%	\$6,115	20.0%	\$12,206	39.9%
Dartmouth	\$6,548	\$29	0.4%	\$1,447	22.1%	\$67	1.0%	\$287	4.4%	\$329	5.0%	\$2,095	32.0%	\$2,294	35.0%
Lowell	\$27,694	\$40	0.1%	\$7,822	28.2%	\$985	3.6%	\$8,120	29.3%	\$1,230	4.4%	\$5,941	21.5%	\$3,556	12.8%
Medical School	\$181,446	\$32	0.0%	\$6,387	3.5%	\$0	0.0%	\$172,140	94.9%	\$0	0.0%	\$1,040	0.6%	\$1,847	1.0%
President's Office	\$1,124	\$0	0.0%	\$0	0.0%	\$0	0.0%	\$400	35.6%	\$0	0.0%	\$88	7.8%	\$636	56.6%
System	\$353,689	\$9,049	2.6%	\$28,228	8.0%	\$6,306	1.8%	\$215,309	60.9%	\$6,365	1.8%	\$53,299	15.1%	\$35,133	9.9%

Source: Campus NSF surveys. All dollars are in thousands.
Note: HHS includes NIH

FY 2016 Total R&D Expenditures by Field (Federal and Non-Federal)

FIELD	UMA					UMB				
	Federal	Non-Federal	UMA Total	% of UMA Total	% of Field	Federal	Non-Federal	UMB Total	% of UMB Total	% of Field
Engineering (Total)	\$23,889	\$23,368	\$47,257	22.0%	65.5%	\$594	\$204	\$798	1.2%	1.1%
Aerospace, Aeronautical, Astronaut. Engg.	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%
Bioengineering/Biomedical	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%
Chemical	\$7,219	\$10,022	\$17,241	8.0%	72.6%	\$0	\$0	\$0	0.0%	0.0%
Civil	\$4,657	\$6,022	\$10,679	5.0%	79.5%	\$125	\$21	\$146	0.2%	0.0%
Electrical	\$8,032	\$3,755	\$11,787	5.5%	57.1%	\$469	\$183	\$652	1.0%	3.2%
Industrial and Manufacturing	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%
Mechanical	\$3,934	\$3,259	\$7,193	3.4%	58.9%	\$0	\$0	\$0	0.0%	0.0%
Metallurgical & Materials	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%
Other	\$47	\$310	\$357	0.2%	31.0%	\$0	\$0	\$0	0.0%	0.0%
Physical Sciences (Total)	\$16,767	\$6,479	\$23,246	10.8%	57.9%	\$1,262	\$464	\$1,726	2.7%	4.3%
Astronomy and Astrophysics	\$2,275	\$1,308	\$3,583	1.7%	100.0%	\$0	\$0	\$0	0.0%	0.0%
Chemistry	\$9,748	\$2,611	\$12,359	5.8%	70.8%	\$619	\$305	\$924	1.4%	5.3%
Materials Science	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%
Physics	\$4,744	\$2,560	\$7,304	3.4%	38.6%	\$643	\$159	\$802	1.2%	4.2%
Other Physical Sciences	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%
Geo/Atmosp./Ocean Sciences (Total)	\$2,643	\$1,206	\$3,849	1.8%	17.9%	\$3,609	\$3,087	\$6,696	10.4%	31.1%
Atmospheric Sc. And Meteorology	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%
Geological and Earth Sciences	\$2,643	\$1,206	\$3,849	1.8%	55.6%	\$1,955	\$646	\$2,601	4.0%	0.0%
Ocean Sciences and Marine Sciences	\$0	\$0	\$0	0.0%	0.0%	\$1,654	\$2,441	\$4,095	6.4%	28.0%
Other Geo/Atmosp./Ocean Sciences	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%
Mathematics and Statistics (Total)	\$1,383	\$1,112	\$2,495	1.2%	64.1%	\$56	\$56	\$112	0.2%	2.9%
Computer Sciences (Total)	\$12,423	\$8,173	\$20,596	9.6%	69.2%	\$1,557	\$979	\$2,536	3.9%	8.5%
Life Sciences (Total)	\$34,643	\$49,314	\$83,957	39.1%	23.0%	\$4,375	\$6,497	\$10,872	16.9%	3.0%
Agricultural	\$6,527	\$5,970	\$12,497	5.8%	100.0%	\$0	\$0	\$0	0.0%	0.0%
Biological and Biomedical Sciences	\$12,441	\$9,865	\$22,306	10.4%	20.5%	\$2,017	\$1,209	\$3,226	5.0%	3.0%
Health Sciences	\$9,855	\$8,838	\$18,693	8.7%	14.0%	\$2,325	\$5,122	\$7,447	11.6%	5.6%
Natural Resources and Conservation	\$5,820	\$5,268	\$11,088	5.2%	99.0%	\$33	\$79	\$112	0.2%	0.2%
Other Life Sciences	\$0	\$19,373	\$19,373	9.0%	19.6%	\$0	\$87	\$87	0.1%	0.1%
Psychology (Total)	\$4,095	\$2,807	\$6,902	3.2%	54.6%	\$2,558	\$1,371	\$3,929	6.1%	31.1%
Social Sciences (Total)	\$1,332	\$3,475	\$4,807	2.2%	26.3%	\$3,008	\$5,081	\$8,089	12.6%	44.3%
Anthropology	\$258	\$842	\$1,100	0.5%	53.4%	\$578	\$182	\$760	1.2%	36.9%
Economics	\$113	\$876	\$989	0.5%	49.8%	\$50	\$80	\$130	0.2%	6.5%
Political Science and Government	\$304	\$449	\$753	0.4%	20.3%	\$144	\$2,397	\$2,541	4.0%	68.5%
Sociology, Demography, Popn. Studies	\$424	\$844	\$1,268	0.6%	23.9%	\$2,153	\$1,496	\$3,649	5.7%	68.6%
Other Social Sciences	\$233	\$464	\$697	0.3%	13.4%	\$83	\$926	\$1,009	1.6%	19.5%
Other Sciences (Total)	\$401	\$353	\$754	0.4%	27.9%	\$307	\$155	\$462	0.7%	0.0%
TOTAL, SCI & ENG FIELDS	\$97,576	\$96,287	\$193,863	90.3%	34.2%	\$17,326	\$17,894	\$35,220	54.8%	6.2%
FIELD	Federal	Non-Federal	UMA Total	% of UMA Total	% of Field	Federal	Non-Federal	UMB Total	% of UMB Total	% of Field
Business Mgmt. & Business Admn.	\$168	\$1,679	\$1,847	0.9%	40.1%	\$0	\$1,651	\$1,651	2.6%	35.9%
Comm., and Comm. Technologies	\$0	\$682	\$682	0.3%	99.1%	\$0	\$6	\$6	0.0%	0.0%
Education	\$6,229	\$3,089	\$9,318	4.3%	25.0%	\$12,981	\$11,195	\$24,176	37.6%	64.7%
Humanities	\$230	\$2,165	\$2,395	1.1%	54.5%	\$58	\$248	\$306	0.5%	7.0%
Law	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%
Social Work	\$0	\$0	\$0	0.0%	0.0%	\$223	\$146	\$369	0.6%	0.0%
Visual and Performing Arts	\$178	\$601	\$779	0.4%	40.4%	\$0	\$17	\$17	0.0%	0.9%
Other Non-Science and Engin.	\$1,888	\$3,804	\$5,692	2.7%	34.7%	\$20	\$2,458	\$2,478	3.9%	15.1%
TOTAL, NON-SCI & ENG FIELDS	\$8,693	\$12,020	\$20,713	9.7%	31.5%	\$13,282	\$15,721	\$29,003	45.2%	44.1%
TOTAL, SCI & ENG FIELDS	\$97,576	\$96,287	\$193,863	90.3%	34.2%	\$17,326	\$17,894	\$35,220	54.8%	6.2%
GRAND TOTAL	\$106,269	\$108,307	\$214,576	100.0%		\$30,608	\$33,615	\$64,223	100.0%	10.2%

Source: Campus NSF HERD Surveys. All dollars are in thousands.

Note: Percent of Total is the percent each field represents of total campus or system R&D expenditures in all fields. Percent of Field is the percent of the UMass system's expenditures in a particular field represented by that campus.

FY 2016 Total R&D Expenditures by Field (Federal and Non-Federal)

FIELD	UMD					UML				
	Federal	Non-Federal	UMD Total	% of UMD Total	% of Field	Federal	Non-Federal	UML Total	% of UML Total	% of Field
Engineering (Total)	\$2,240	\$4,470	\$6,710	25.0%	9.3%	\$6,688	\$10,740	\$17,428	25.4%	24.1%
Aerospace, Aeronautical, Astronaut. Engg.		\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%
Bioengineering/Biomedical	\$107	\$877	\$984	3.7%	100.0%	\$0	\$0	\$0	0.0%	0.0%
Chemical	\$0	\$0	\$0	0.0%	0.0%	\$2,319	\$4,196	\$6,515	9.5%	27.4%
Civil	\$363	\$1,465	\$1,828	6.8%	13.6%	\$416	\$369	\$785	1.1%	5.8%
Electrical	\$1,289	\$1,306	\$2,595	9.7%	12.6%	\$2,084	\$3,537	\$5,621	8.2%	27.2%
Industrial and Manufacturing	\$0	\$0	\$0	0.0%		\$0	\$0	\$0	0.0%	0.0%
Mechanical	\$481	\$569	\$1,050	3.9%	8.6%	\$1,811	\$2,154	\$3,965	5.8%	32.5%
Metallurgical & Materials	\$0	\$0	\$0	0.0%	#DIV/0!	\$0	\$0	\$0	0.0%	0.0%
Other	\$0	\$253	\$253	0.9%	22.0%	\$58	\$484	\$542	0.8%	47.0%
Physical Sciences (Total)	\$218	\$1,140	\$1,358	5.1%	3.4%	\$8,612	\$5,229	\$13,841	20.2%	34.5%
Astronomy and Astrophysics	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%
Chemistry	\$123	\$717	\$840	3.1%	4.8%	\$1,519	\$1,822	\$3,341	4.9%	19.1%
Materials Science	\$0	\$69	\$69	0.3%	100.0%	\$0	\$0	\$0	0.0%	0.0%
Physics	\$95	\$242	\$337	1.3%	1.8%	\$7,093	\$3,407	\$10,500	15.3%	55.4%
Other Physical Sciences	\$0	\$112	\$112	0.4%	0.0%	\$0	\$0	\$0	0.0%	0.0%
Geo/Atmosp./Ocean Sciences (Total)	\$2,826	\$7,682	\$10,508	39.2%	48.8%	\$197	\$272	\$469	0.7%	2.2%
Atmospheric Sc. And Meteorology	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%
Geological and Earth Sciences	\$0	\$0	\$0	0.0%	0.0%	\$197	\$272	\$469	0.7%	6.8%
Ocean Sciences and Marine Sciences	\$2,826	\$7,682	\$10,508	39.2%	72.0%	\$0	\$0	\$0	0.0%	0.0%
Other Geo/Atmosp./Ocean Sciences	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%
Mathematics and Statistics (Total)	\$263	\$612	\$875	3.3%	22.5%	\$1	\$409	\$410	0.6%	10.5%
Computer Sciences (Total)	\$74	\$975	\$1,049	3.9%	3.5%	\$2,334	\$3,247	\$5,581	8.1%	18.8%
Life Sciences (Total)	\$821	\$1,716	\$2,537	9.5%	0.7%	\$7,078	\$7,783	\$14,861	21.7%	4.1%
Agricultural	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%
Biological and Biomedical Sciences	\$821	\$1,396	\$2,217	8.3%	2.0%	\$671	\$962	\$1,633	2.4%	1.5%
Health Sciences	\$0	\$320	\$320	1.2%	0.0%	\$63	\$177	\$240	0.4%	0.2%
Natural Resources and Conservation	\$0	\$0	\$0	0.0%		\$0	\$0	\$0	0.0%	0.0%
Other Life Sciences	\$0	\$0	\$0	0.0%	0.0%	\$6,344	\$6,644	\$12,988	19.0%	13.1%
Psychology (Total)	\$21	\$479	\$500	1.9%	4.0%	\$277	\$1,030	\$1,307	1.9%	10.3%
Social Sciences (Total)	\$0	\$824	\$824	3.1%	4.5%	\$1,312	\$3,228	\$4,540	6.6%	24.9%
Anthropology	\$0	\$201	\$201	0.7%	9.8%	\$0	\$0	\$0	0.0%	0.0%
Economics	\$0	\$20	\$20	0.1%	1.0%	\$0	\$846	\$846	1.2%	42.6%
Political Science and Government	\$0	\$3	\$3	0.0%	0.1%	\$0	\$415	\$415	0.6%	11.2%
Sociology, Demography, Popn. Studies	\$0	\$8	\$8	0.0%	0.2%	\$83	\$308	\$391	0.6%	7.4%
Other Social Sciences	\$0	\$592	\$592	2.2%	11.4%	\$1,229	\$1,659	\$2,888	4.2%	55.7%
Other Sciences (Total)	\$0	\$2	\$2	0.0%	0.1%	\$0	\$0	\$0	0.0%	0.0%
TOTAL, SCI & ENG FIELDS	\$6,463	\$17,900	\$24,363	90.8%	4.3%	\$26,499	\$31,938	\$58,437	85.3%	10.3%
FIELD	Federal	Non-Federal	UMD Total	% of UMD Total	% of Field	Federal	Non-Federal	UML Total	% of UML Total	% of Field
Business Mgmt. & Business Admn.	\$0	\$413	\$413	1.5%	9.0%	\$9	\$634	\$643	0.9%	14.0%
Comm., and Comm. Technologies	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%
Education	\$85	\$387	\$472	1.8%	1.3%	\$557	\$998	\$1,555	2.3%	4.2%
Humanities	\$0	\$708	\$708	2.6%	16.1%	\$0	\$988	\$988	1.4%	22.5%
Law	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%
Social Work	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%
Visual and Performing Arts	\$0	\$340	\$340	1.3%	17.6%	\$0	\$792	\$792	1.2%	41.1%
Other Non-Science and Engin.	\$0	\$528	\$528	2.0%	3.2%	\$629	\$5,450	\$6,079	8.9%	37.0%
TOTAL, NON-SCI & ENG FIELDS	\$85	\$2,376	\$2,461	9.2%	3.7%	\$1,195	\$8,862	\$10,057	14.7%	15.3%
TOTAL, SCI & ENG FIELDS	\$6,463	\$17,900	\$24,363	90.8%	4.3%	\$26,499	\$31,938	\$58,437	85.3%	10.3%
GRAND TOTAL	\$6,548	\$20,276	\$26,824	100.0%	4.2%	\$27,694	\$40,800	\$68,494	100.0%	10.8%

Source: Campus NSF HERD Surveys. All dollars are in thousands.

Note: Percent of Total is the percent each field represents of total campus or system R&D expenditures in all fields. Percent of Field is the percent of the UMass system's expenditures in a particular field represented by that campus.

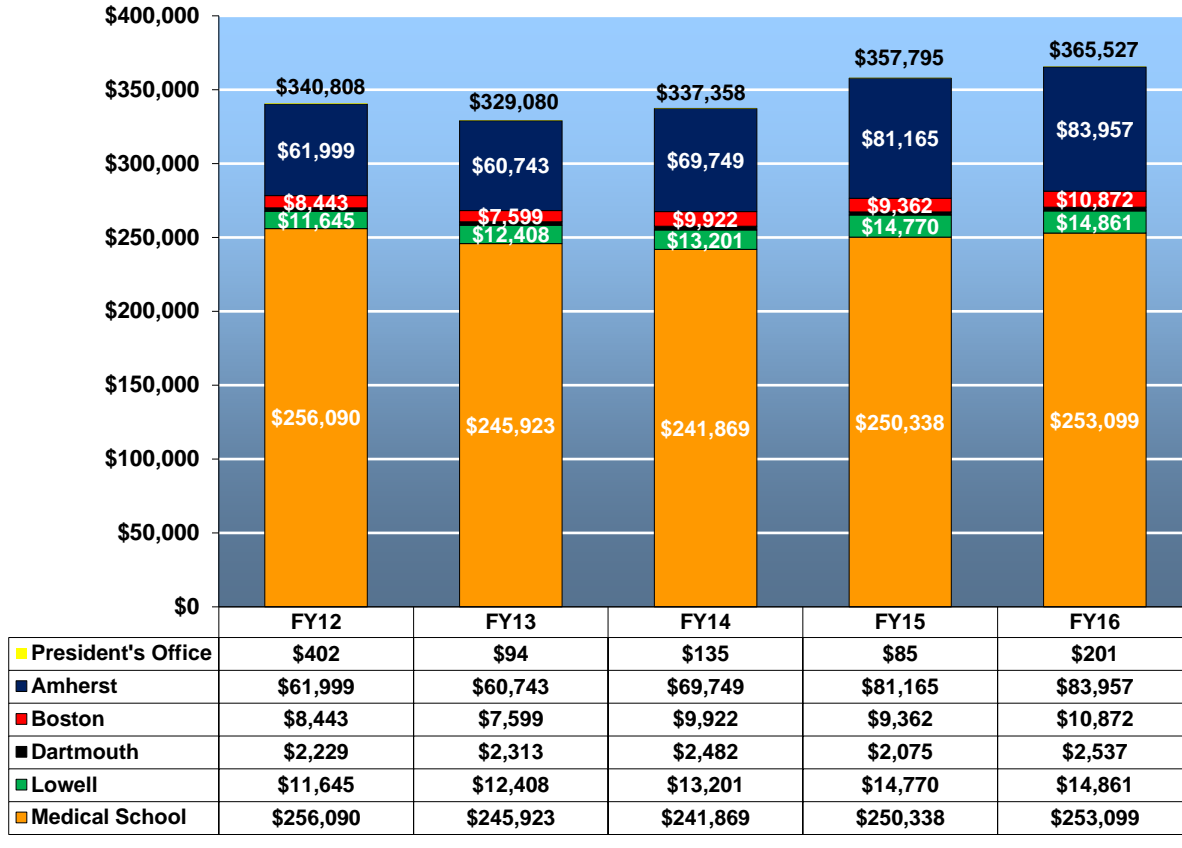
FY 2016 Total R&D Expenditures by Field (Federal and Non-Federal)

FIELD	UMMS					UMPO					UMass System			
	Federal	Non-Federal	UMMS Total	% of UMMS	% of Field	Federal	Non-Federal	UMPO Total	% of UMPO	% of Field	Federal	Non-Federal	System Total	% of System
Engineering (Total)	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$33,411	\$38,782	\$72,193	11.4%
Aerospace, Aeronautical, Astronaut. Engg.	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%
Bioengineering/Biomedical	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$107	\$877	\$984	0.2%
Chemical	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$9,538	\$14,218	\$23,756	3.8%
Civil	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$5,561	\$7,877	\$13,438	2.1%
Electrical	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$11,874	\$8,781	\$20,655	3.3%
Industrial and Manufacturing	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%
Mechanical	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$6,226	\$5,982	\$12,208	1.9%
Metallurgical & Materials	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%
Other	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$105	\$1,047	\$1,152	0.2%
Physical Sciences (Total)	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$26,859	\$13,312	\$40,171	6.4%
Astronomy and Astrophysics	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$2,275	\$1,308	\$3,583	0.6%
Chemistry	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$12,009	\$5,455	\$17,464	2.8%
Materials Science	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$0	\$69	\$69	0.0%
Physics	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$12,575	\$6,368	\$18,943	3.0%
Other Physical Sciences	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$0	\$112	\$112	0.0%
Geo/Atmosp./Ocean Sciences (Total)	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$9,275	\$12,247	\$21,522	3.4%
Atmospheric Sc. And Meteorology	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%
Geological and Earth Sciences	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$4,795	\$2,124	\$6,919	1.1%
Ocean Sciences and Marine Sciences	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$4,480	\$10,123	\$14,603	2.3%
Other Geo/Atmosp./Ocean Sciences	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%
Mathematics and Statistics (Total)	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$1,703	\$2,189	\$3,892	0.6%
Computer Sciences (Total)	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$16,388	\$13,374	\$29,762	4.7%
Life Sciences (Total)	\$181,446	\$71,653	\$253,099	100.0%	69.2%	\$201	\$0	\$201	3.9%	0.1%	\$228,564	\$136,963	\$365,527	57.8%
Agricultural	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$6,527	\$5,970	\$12,497	2.0%
Biological and Biomedical Sciences	\$60,053	\$19,418	\$79,471	31.4%	73.0%	\$0	\$0	\$0	0.0%	0.0%	\$76,003	\$32,850	\$108,853	17.2%
Health Sciences	\$72,853	\$34,349	\$107,202	42.4%	80.0%	\$85	\$0	\$85	2.4%	0.1%	\$85,181	\$48,806	\$133,987	21.2%
Natural Resources and Conservation	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$5,853	\$5,347	\$11,200	1.8%
Other Life Sciences	\$48,540	\$17,886	\$66,426	26.2%	67.1%	\$116	\$0	\$116	2.2%	0.1%	\$55,000	\$43,990	\$98,990	15.7%
Psychology (Total)	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$6,951	\$5,687	\$12,638	2.0%
Social Sciences (Total)	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$5,652	\$12,608	\$18,260	2.9%
Anthropology	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$836	\$1,225	\$2,061	0.3%
Economics	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$163	\$1,822	\$1,985	0.3%
Political Science and Government	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$448	\$3,264	\$3,712	0.6%
Sociology, Demography, Popn. Studies	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$2,660	\$2,656	\$5,316	0.8%
Other Social Sciences	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$1,545	\$3,641	\$5,186	0.8%
Other Sciences (Total)	\$0	\$0	\$0	0.0%	0.0%	\$0	\$1,489	\$1,489	28.5%	55.0%	\$708	\$1,999	\$2,707	0.4%
TOTAL, SCI & ENG FIELDS	\$181,446	\$71,653	\$253,099	100.0%	44.7%	\$201	\$1,489	\$1,690	32.4%	0.3%	\$329,511	\$237,161	\$566,672	89.6%
FIELD	Federal	Non-Federal	UMW Total	% of UMW	% of Field	Federal	Non-Federal	UMPO Total	% of UMPO	% of Field	Federal	Non-Federal	UMass Total	% of Total
Business Mgmt. & Business Admn.	\$0	\$0	\$0	0.0%	0.0%	\$0	\$47	\$47	0.9%	1.0%	\$177	\$4,424	\$4,601	0.7%
Comm., and Comm. Technologies	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$0	\$688	\$688	0.1%
Education	\$0	\$0	\$0	0.0%	0.0%	\$884	\$936	\$1,820	34.9%	4.9%	\$20,736	\$16,605	\$37,341	5.9%
Humanities	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$288	\$4,109	\$4,397	0.7%
Law	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%
Social Work	\$0	\$0	\$0	0.0%	0.0%	\$0	\$21	\$21	0.0%	0.0%	\$223	\$167	\$390	0.0%
Visual and Performing Arts	\$0	\$0	\$0	0.0%	0.0%	\$0	\$0	\$0	0.0%	0.0%	\$178	\$1,750	\$1,928	0.3%
Other Non-Science and Engin.	\$0	\$0	\$0	0.0%	0.0%	\$39	\$1,602	\$1,641	31.4%	10.0%	\$2,576	\$13,842	\$16,418	2.6%
TOTAL, NON-SCI & ENG FIELDS	\$0	\$0	\$0	0.0%	0.0%	\$923	\$2,606	\$3,529	67.6%	5.4%	\$24,178	\$41,585	\$65,763	10.4%
TOTAL, SCI & ENG FIELDS	\$181,446	\$71,653	\$253,099	100.0%	44.7%	\$201	\$1,489	\$1,690	32.4%	0.3%	\$329,511	\$237,161	\$566,672	89.6%
GRAND TOTAL	\$181,446	\$71,653	\$253,099	100.0%	40.0%	\$1,124	\$4,095	\$5,219	100.0%	0.8%	\$353,689	\$278,746	\$632,435	100.0%

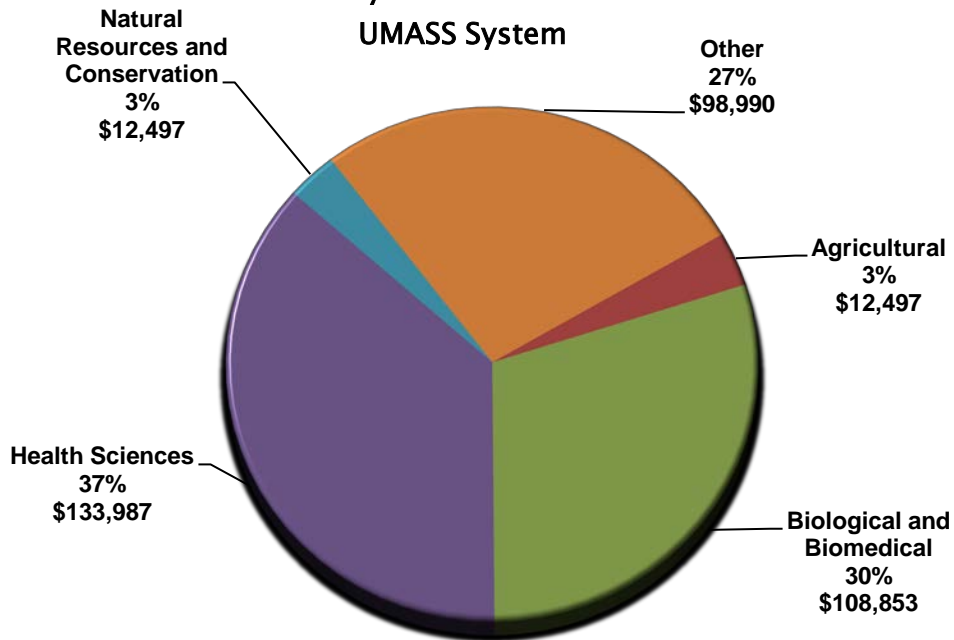
Source: Campus NSF HERD Surveys. All dollars are in thousands.

Note: Percent of Total is the percent each field represents of total campus or system R&D expenditures in all fields. Percent of Field is the percent of the UMass system's expenditures in a particular field represented by that campus.

**Life Sciences R&D Expenditures
UMASS System FY2012 – FY2016
(Dollars in Thousands)**



**Life Sciences R&D Expenditures
by Field FY2016
UMASS System**



Source: Campus NSF surveys. All dollars are in thousands.

Life Sciences R&D Expenditures by Field Trend Data

(Dollars in Thousands)

	Total Life Sciences R&D (FY2012-FY2016)								
	FY12	FY13	FY14	FY15	FY16	5-Year Change FY12 - FY16		1-Year Change FY15-FY16	
						\$	%	\$	%
Amherst	\$61,999	\$60,743	\$69,749	\$81,165	\$83,957	\$21,958	35%	\$2,792	3%
Boston	\$8,443	\$7,599	\$9,922	\$9,362	\$10,872	\$2,429	29%	\$1,510	16%
Dartmouth	\$2,229	\$2,313	\$2,482	\$2,075	\$2,537	\$308	14%	\$462	22%
Lowell	\$11,645	\$12,408	\$13,201	\$14,770	\$14,861	\$3,216	28%	\$91	1%
Medical School	\$256,090	\$245,923	\$241,869	\$250,338	\$253,099	-\$2,991	-1%	\$2,761	1%
President's Office	\$402	\$94	\$135	\$85	\$201	-\$201	-50%	\$116	136%
System	\$340,808	\$329,080	\$337,358	\$357,795	\$365,527	\$24,719	7%	\$7,732	2%

	Agricultural (FY2011-FY2015)*								
	FY11	FY12	FY13	FY14	FY15	5-Year Change FY11 - FY15		1-Year Change FY14-FY15	
						\$	%	\$	%
Amherst	\$28,669	\$29,881	\$22,631	\$24,079	\$24,915	-\$3,754	-13%	\$836	3%
Boston	\$0	\$0	\$0	\$0	\$124	\$124	NA	\$124	NA
Dartmouth	\$946	\$1,170	\$809	\$202	\$0	-\$946	-100%	-\$202	-100%
Lowell	\$0	\$0	\$0	\$0	\$0	\$0	NA	\$0	NA
Medical School	\$0	\$0	\$0	\$0	\$0	\$0	NA	\$0	NA
President's Office	\$0	\$0	\$0	\$0	\$0	NA	NA	\$0	NA
System	\$29,615	\$31,051	\$23,440	\$24,281	\$25,039	-\$4,576	-15%	\$758	3%

	Biological (FY2011-FY2015)*								
	FY11	FY12	FY13	FY14	FY15	5-Year Change FY11 - FY15		1-Year Change FY14-FY15	
						\$	%	\$	%
Amherst	\$23,276	\$25,081	\$26,981	\$22,885	\$20,002	-\$3,274	-14%	-\$2,883	-13%
Boston	\$2,581	\$2,773	\$2,592	\$2,913	\$3,305	\$724	28%	\$392	13%
Dartmouth	\$1,004	\$938	\$1,503	\$2,219	\$1,946	\$942	94%	-\$273	-12%
Lowell	\$1,553	\$1,999	\$1,470	\$1,837	\$1,896	\$343	22%	\$59	3%
Medical School	\$88,359	\$91,140	\$77,287	\$80,169	\$74,963	-\$13,396	-15%	-\$5,206	-6%
President's Office	NA	\$0	\$0	\$0	\$0	NA	NA	\$0	NA
System	\$116,773	\$121,931	\$109,833	\$110,023	\$102,112	-\$14,661	-13%	-\$7,911	-7%

*Please Note: Historical trend data in the Life Sciences sub-fields is only available for FY11-FY15, since the sub-fields were reclassified in the FY16 HERD surveys. Trend data for the sub-fields will be reported from next year onwards.

Life Sciences R&D Expenditures by Field Trend Data

(Dollars in Thousands)

Medical (FY2011-FY2015)*									
	FY11	FY12	FY13	FY14	FY15	5-Year Change FY11 - FY15		1-Year Change FY14-FY15	
						\$	%	\$	%
						Amherst	\$6,473	\$6,276	\$9,661
Boston	\$4,675	\$4,345	\$812	\$2,294	\$1,358	-\$3,317	-71%	-\$936	-41%
Dartmouth	\$0	\$0	\$0	\$13	\$22	\$22	NA	\$9	NA
Lowell	\$252	\$0	\$47	\$113	\$125	-\$127	NA	\$12	11%
Medical School	\$133,598	\$127,032	\$121,754	\$107,810	\$108,063	-\$25,535	-19%	\$253	0%
President's Office	NA	\$263	\$44	\$75	\$0	NA	NA	-\$75	NA
System	\$144,998	\$137,916	\$132,318	\$124,186	\$121,599	-\$23,399	-16%	-\$2,587	-2%

Other (FY2011-FY2015)									
	FY11	FY12	FY13	FY14	FY15	5-Year Change FY11 - FY15		1-Year Change FY14-FY15	
						\$	%	\$	%
						Amherst	\$528	\$761	\$1,470
Boston	\$1,022	\$1,325	\$4,195	\$4,715	\$4,575	\$3,553	348%	-\$140	-3%
Dartmouth	\$71	\$121	\$1	\$48	\$107	\$36	51%	\$59	123%
Lowell	\$10,556	\$9,646	\$10,891	\$11,251	\$12,749	\$2,193	21%	\$1,498	13%
Medical School	\$ 40,757	\$ 37,918	\$ 46,882	\$ 53,890	\$ 67,312	\$26,555	65%	\$13,422	25%
President's Office	NA	\$139	\$50	\$60	\$85	NA	NA	\$25	42%
System	\$52,934	\$49,910	\$63,489	\$78,868	\$109,045	\$56,111	106%	\$30,177	38%

Source: Campus NSF surveys and WebCASPAR. All dollars are in thousands.

*Please Note: Historical trend data in the Life Sciences sub-fields is only available for FY11-FY15, since the sub-fields were reclassified in the FY16 HERD surveys. Trend data for the sub-fields will be reported from next year onwards.

TECHNICAL NOTE

The *FY2016 Annual Research and Development Expenditures Report* presents information on the research and development expenditures for the University of Massachusetts System.

The NSF Survey Definition for Research and development (R&D) is R&D is creative and systematic work undertaken in order to increase the stock of knowledge - including knowledge of humankind, culture, and society - and to devise new applications of available knowledge. R&D covers three activities defined below - basic research, applied research, and experimental development.

- Basic research is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without any particular application or use in view.
- Applied research is original investigation undertaken in order to acquire new knowledge. It is directed primarily towards a specific, practical aim or objective.
- Experimental development is systematic work, drawing on knowledge gained from research and practical experience and producing additional knowledge, which is directed to producing new products or processes or to improving existing products or processes.

R&D Expenditures – (What to Include) - For purposes of the HERD survey, R&D includes expenditures for organized research as defined by 2 CFR 200 Appendix III and expenditures from funds designated for research.

R&D <i>includes</i> :	R&D does <i>not</i> include:
<ul style="list-style-type: none"> • Sponsored research (federal and nonfederal) • University research (institutional funds that are separately budgeted for individual R&D projects) • Startup, bridge, or seed funding provided to researchers within your institution • Other departmental funds designated for research • Recovered and unrecovered indirect costs (see definitions in Question 1) • Equipment purchased from R&D project accounts • R&D funds passed through to a sub-recipient organization, educational or other • Clinical trials, Phases I, II, or III (see definition in Question 5) • Research training grants funding work on organized research projects • Tuition remission provided to students working on research 	<ul style="list-style-type: none"> • Public service grants or outreach programs • Curriculum development (unless included as part of an overall research project) • R&D conducted by university faculty or staff at outside institutions that is not accounted for in your financial records • Estimates of the proportion of time budgeted for instruction that is spent on research • Capital projects (i.e., construction or renovation of research facilities) • Non-research training grants • Unrecovered indirect costs that exceed your institution’s federally negotiated Facilities and Administrative (F&A) rate

Source: FY 2016 HERD Survey

TECHNICAL NOTE (CONT'D)

Changes to Questions in the FY2016 HERD Survey:

- **Postdocs:** The question regarding the number of postdocs paid from R&D expenditures (formerly Question 16) has been removed from the survey.
- **Question 2:** This question has been expanded to ask for sources of foreign-funded R&D. The question now asks for R&D expenditures funded by foreign governments, businesses, nonprofit organizations, and higher education. If you cannot break out expenditures for these new categories this year, check the box at the top of Question 2 and enter total expenditures from foreign sources on row e.
- **Question 6:** In addition to the updated definitions of basic research, applied research, and experimental development (also see Survey Definitions and Instructions on the following page), the third example provided in this question has been revised to facilitate better understanding of the differences between each type of R&D.
- **Questions 9, 11, and 14:** There have been several revisions to the fields of R&D for which you are asked to report expenditures. These changes better reflect the types of R&D currently being conducted at universities and colleges and also make the survey fields more consistent with the taxonomy used by the Department of Education's Classification of Instructional Programs (CIP).

Changes to the fields of R&D include the following:

- Fields are listed in alphabetical order.
- The names of some fields have been revised to better reflect the disciplines included in those fields.
- New disciplines have been added as examples under many fields.
- Some disciplines have been reclassified under different fields.
- Four new fields have been added: (1) Industrial and Manufacturing Engineering under Engineering, (2) Natural Resources and Conservation under Life Sciences, (3) Materials Science under Physical Sciences, and (4) Anthropology under Social Sciences.

Please see "Reference Materials" on the survey website for additional information about which disciplines have been reclassified under different fields.

Additional highlights as well as rankings and comparative data can be found in the expanded version of this report (to be released shortly). Please contact us at the University of Massachusetts President's Office, Office of Institutional Research, if you would like to obtain a hard copy.

Adam Collins
IR Analyst

Neena Verma
Director of Institutional Research