



# UNIVERSITY OF MASSACHUSETTS

*Amherst – Boston – Dartmouth – Lowell – Worcester – UMassOnline*

# FY 2009 Annual R&D Expenditures

UMass President's Office  
*Office of Institutional Research*  
March 2010

## Introduction

The *FY2009 Annual Research and Development Expenditures* Report presents information on the research and development expenditures for the University of Massachusetts System. It is based on data that our five campuses provide to the National Science Foundation (NSF) through its annual Survey of Research and Development Expenditures at Universities and Colleges. The report is comprised of three sections: Total R&D Expenditures (pages 1-7), Science & Engineering R&D Expenditures (pages 9-13), and Life Sciences R&D Expenditures (pages 14-15). In addition to the FY2009 data, this report also provides trend data in many cases.

### Major Highlights:

- **UMass Total R&D Expenditures** - Total FY2009 R&D expenditures for the University of Massachusetts System was reported at \$489.1 million, which represents a 12.4% increase from the FY2008 total of \$435 million.
- **Growth in Total R&D Expenditures (UMass versus All U.S. Institutions)** – Total R&D expenditures for the University of Massachusetts System has grown at a higher rate than the national trend for all U.S. institutions. In FY2008 (most recent comparison data available), while the UMass system reflected an annual growth rate of 9.5% over the previous year, All U.S. Institutions reflected a growth rate of 5.2%.
- **UMass R&D Expenditures in Science and Engineering** – In FY2009, an estimated \$469 million (95.8%) of our R&D expenditures are in the sciences and engineering (S&E).
- **UMass State Ranking in Science and Engineering R&D Expenditures** - Among Massachusetts colleges and universities, UMass continues to rank 3<sup>rd</sup> in S&E expenditures. UMass, MIT, Harvard and BU together account for 79% of the academic science and engineering R&D expenditures in the state. (Rankings based on FY 2008 data).
- **UMass R&D Expenditures by Funding Source (FY2009)** - In terms of funding sources for Science and Engineering research, 58% is from the federal government, 25% is from institutional sources, 3% is from state and local government, 6% is from industry and 8% is from other sources (e.g., private foundations).
- **UMass Areas of Funding Growth** – Between the reporting cycles FY2008-09, industry sponsorship dropped slightly by 1.7%, institutional funding increased 52%, other funding increased 18.2%, and federal funding stayed almost level from the prior year.
- **Life Sciences Continues to Comprise More Than Half of all R&D Expenditures at UMass** - At \$275 million, life sciences constitute more than half of UMass' total R&D expenditures (56.8%). FY2008 distribution of R&D expenditures by field is:

|                        |       |                          |      |
|------------------------|-------|--------------------------|------|
| Life Sciences          | 56.1% | Social Sciences          | 4.1% |
| Physical Sciences      | 7.0%  | Non Sciences/Engineering | 4.2% |
| Engineering            | 15.7% | Psychology               | 2.7% |
| Computer Sciences      | 4.3%  | Mathematical Sciences    | 0.7% |
| Environmental Sciences | 4.4%  | Other Sciences           | 0.7% |

**A Note on Definitions and Criteria For ‘R&D Expenditures’** - According to the National Science Foundation Survey of Research And Development Expenditures,“(Separately budgeted) R&D Expenditures include all funds expended for activities that are specifically organized to produce research outcomes. These activities are either commissioned by an agency external to the institution or are separately budgeted by an organizational unit within the institution. Expenditures are funds actually spent by an institution during its fiscal year. Separately budgeted R&D equipment purchased from current funds includes all research equipment purchased under sponsored research project awards.” [www.nsf.org](http://www.nsf.org). Please note that the NSF R&D Expenditures data do not include research monies expended in any training or education activities. NSF Data Definitions on Funding Sources are as follows:<sup>1</sup>

**a. Federal Government.** Report awards for R&D (including direct and reimbursed indirect costs) by all agencies of the Federal Government.

**b. State and Local Governments.** Include funds for R&D (including direct and reimbursed indirect costs) from State, county, municipal, or other local governments and their agencies. Include here State funds that support R&D at agricultural and other experiment stations.

**c. Industry.** Include all awards for R&D (including direct and reimbursed indirect costs) from profit-making organizations, whether engaged in production, distribution, research, service, or other activities. Do not include awards from nonprofit foundations financed by industry; these should be included under “All other sources.”

**d. Institution Funds.** Report funds, including related indirect costs, that your institution spent for R&D activities from the following unrestricted sources: general-purpose State or local government appropriations; general-purpose awards from industry, foundations, or other outside sources; tuition and fees; endowment income; gifts; and other institutional funds. In addition, estimate your institution's on-campus and off-campus unreimbursed indirect costs associated with externally funded R&D projects, including mandatory and voluntary cost sharing. To estimate unreimbursed indirect costs, preferably on a project-by-project basis, use your appropriate on-campus or off-campus *negotiated research indirect cost rate(s)* multiplied by the corresponding base(s) minus actual indirect cost recovery.

**e. All Other Sources.** Include awards for R&D (including direct and reimbursed indirect costs) from nonprofit foundations and voluntary health agencies as well as from all other sources not elsewhere classified. Also include gifts from individuals that are restricted by the donor to research. Funds from foundations that are affiliated with, or granted solely to your institution, should be included under “Institution funds.” Funds for R&D received from a health agency that is a unit of a State or local government should be included under “State and local governments.”

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.

**Please Note:** Following the implementation system-wide of ERP research administration software in 2007, significant improvements have been made to the methodology used to gather, analyze, and report the FY2009 R&D Expenditures data. Although variations at the aggregate level are not overly significant, there might be a slight impact of possible methodological inconsistencies for trended data at the sub-category levels. Comparison to data from prior years should be made with this awareness, as campuses are currently in the process of reviewing their methodology.

Barbara Velardi  
Research Associate

Neena Verma  
Director of Institutional Research

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<sup>1</sup>Source: National Science Foundation Survey of Research and Development Expenditures at Universities and Colleges.

**TOTAL R&D EXPENDITURES**

- **FY2005 - FY2009**
  - UMASS SYSTEM *1*
  - UMASS AMHERST *2*
  - UMASS BOSTON *3*
  - UMASS DARTMOUTH *4*
  - UMASS LOWELL *5*
  - UMASS WORCESTER *6*
- **TOTAL R&D EXPENDITURES BY FIELD FY2009** *7*

**SCIENCE & ENGINEERING R&D EXPENDITURES**

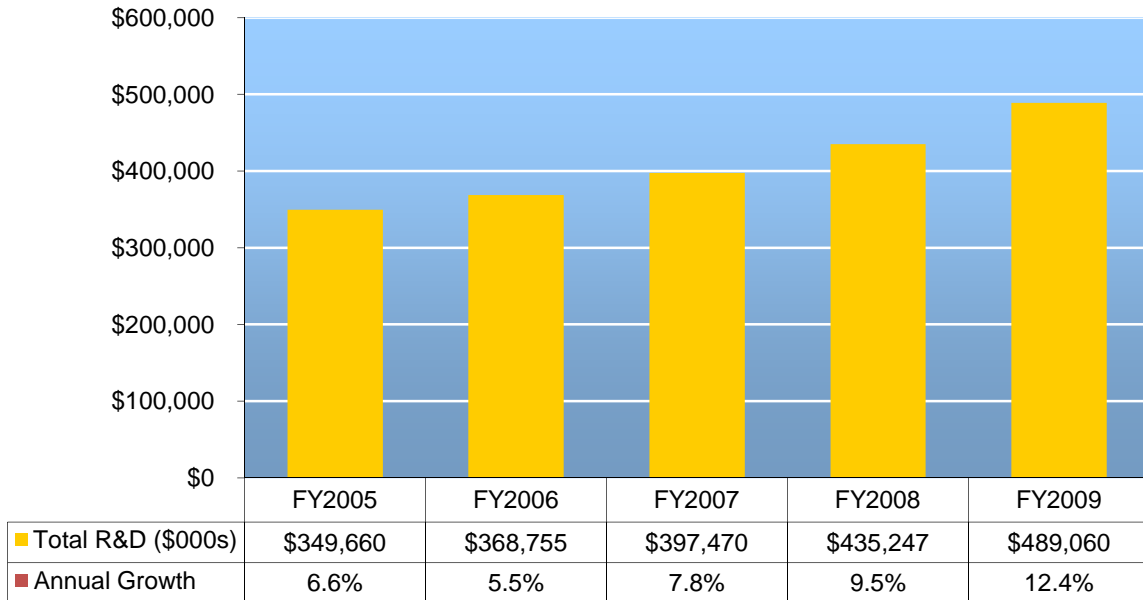
- **FY2005 - FY2009**
- **EXPENDITURES BY SOURCE FY2009** *9*
- **EXPENDITURES BY SOURCE FY2005 - FY2009** *10*
- **PERCENT BASIC RESEARCH FY2009** *12*
- **FEDERAL GOVERNMENT AGENCY SOURCES FY2009** *13*

**LIFE SCIENCES R&D EXPENDITURES**

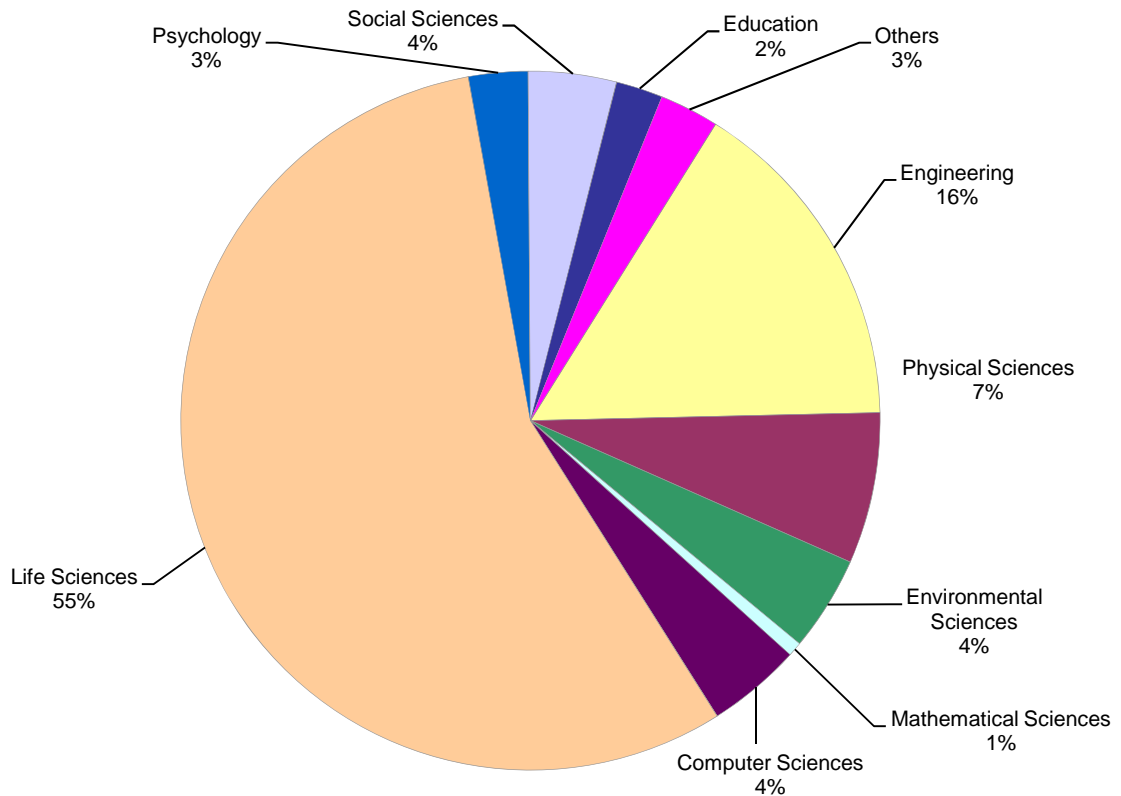
- **FY2005 - FY2009** *14*
- **EXPENDITURES BY FIELD FY2009** *14*
- **EXPENDITURES BY FIELD FY2005 - FY2009** *15*

# UMASS System

## Total R&D Expenditures FY2005 - FY2009

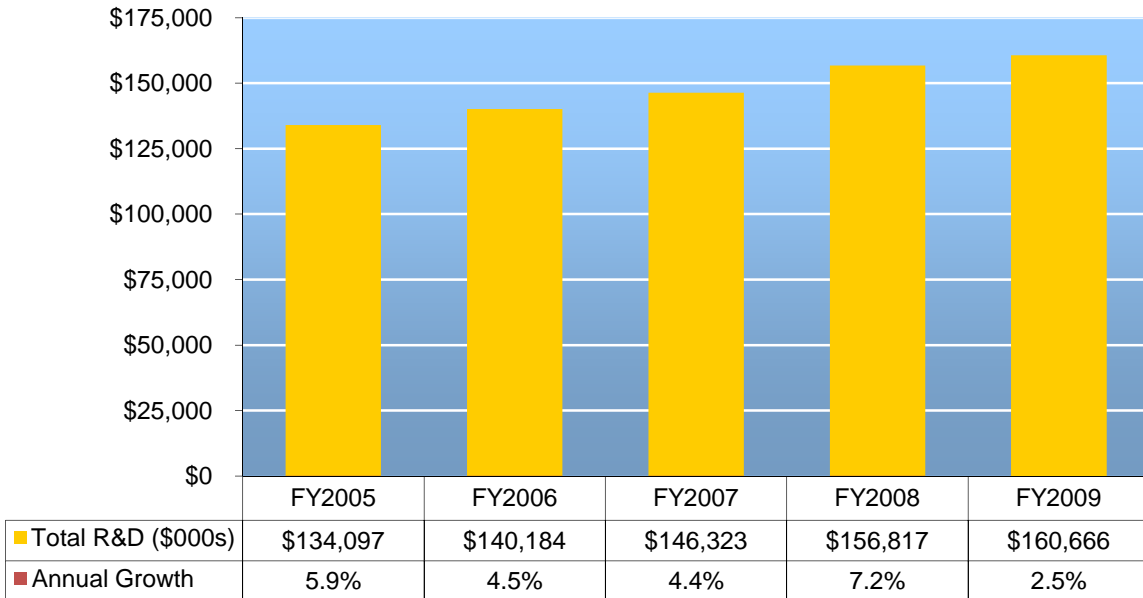


## Total R&D Expenditures FY2009

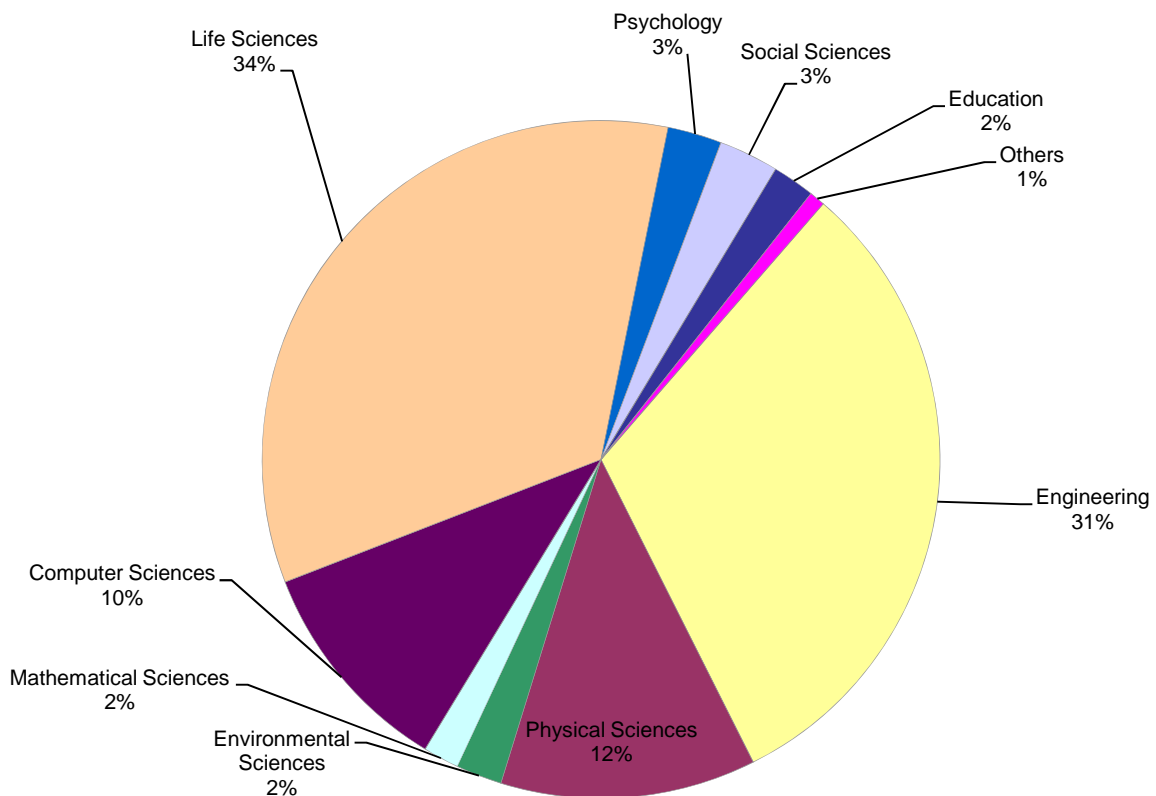


# Amherst

## Total R&D Expenditures FY2005 – FY2009

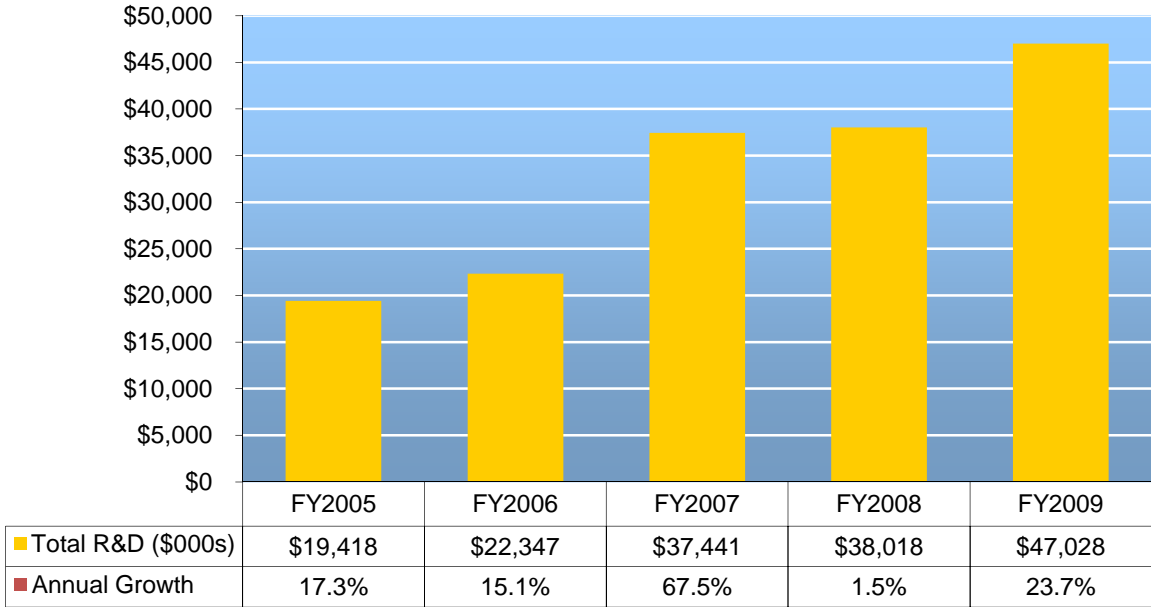


## Total R&D Expenditures FY2009

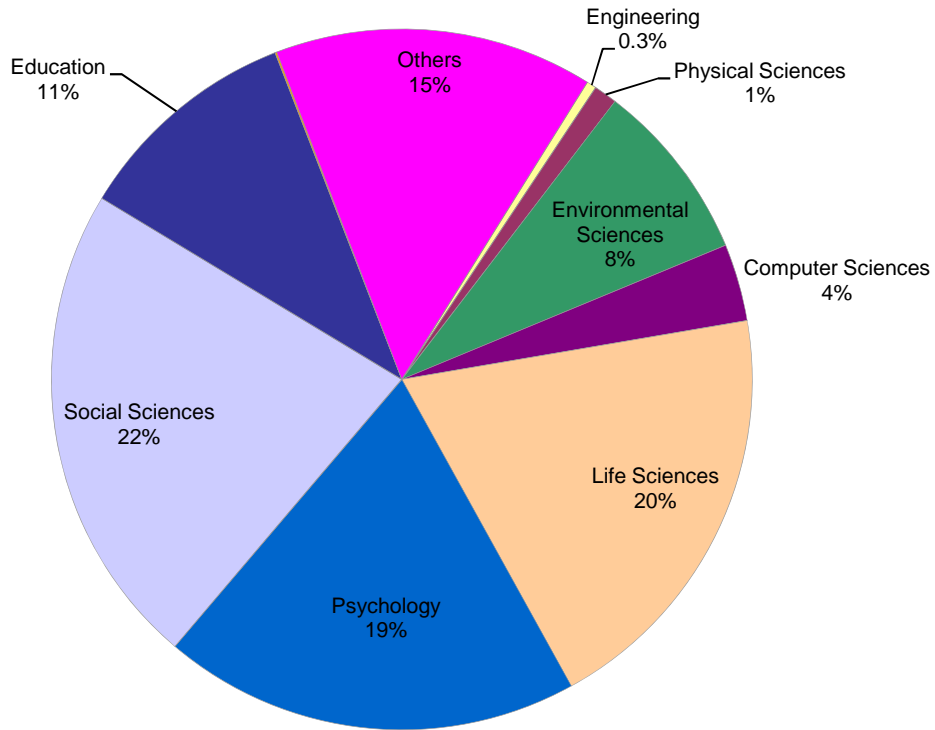


# Boston

## Total R&D Expenditures FY2005 – FY2009

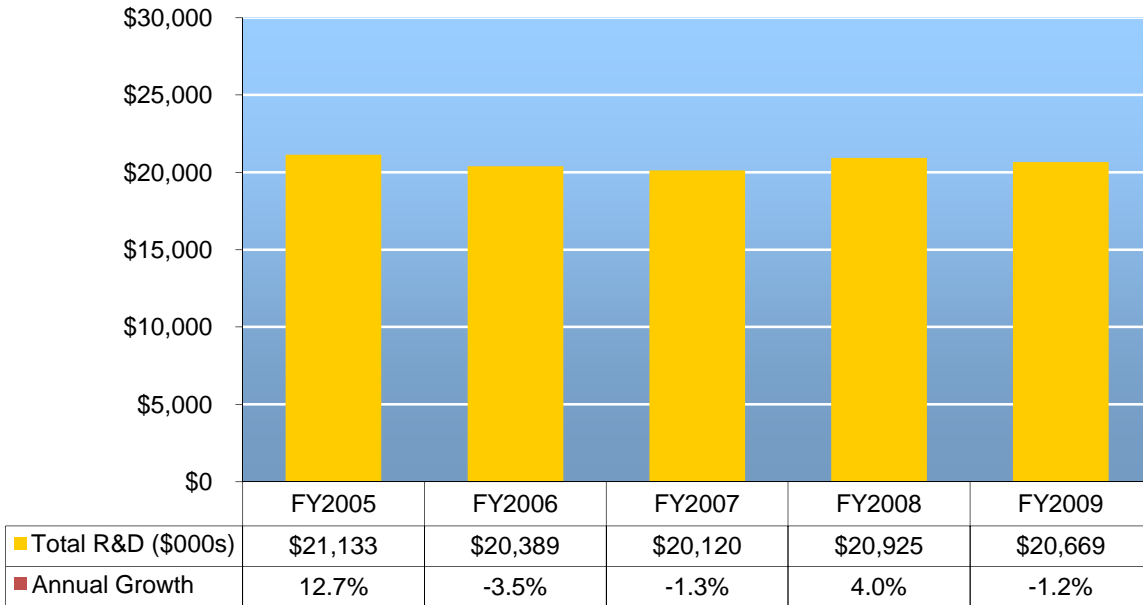


## Total R&D Expenditures FY2009

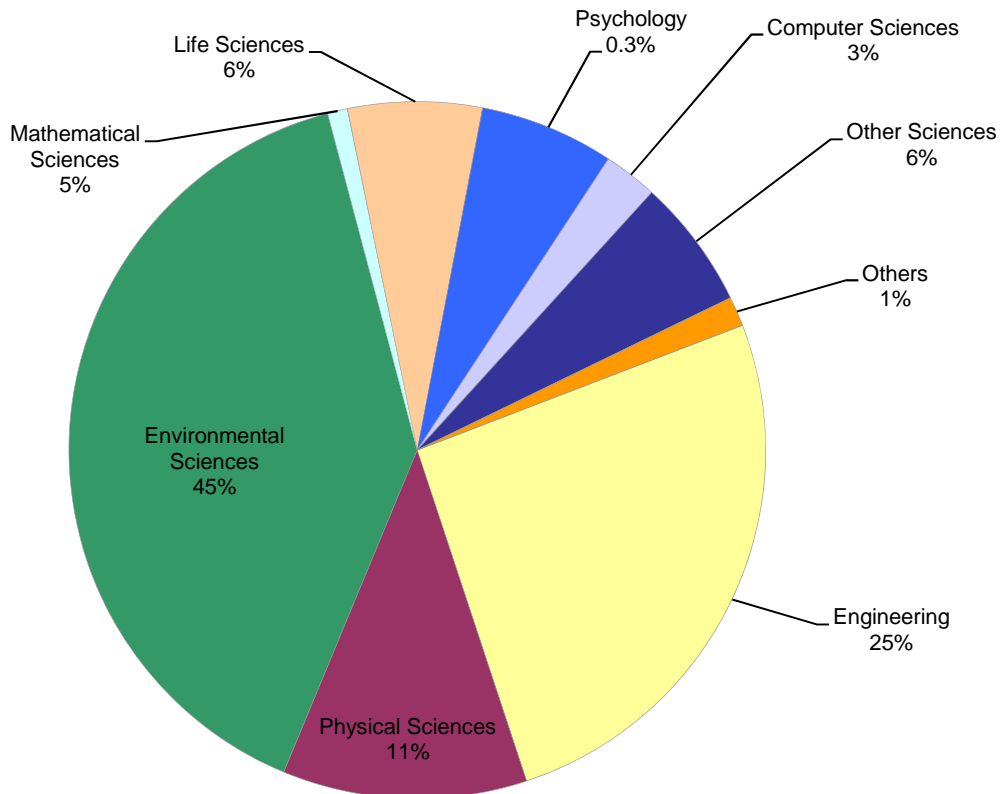


# Dartmouth

## Total R&D Expenditures FY2005 – FY2009

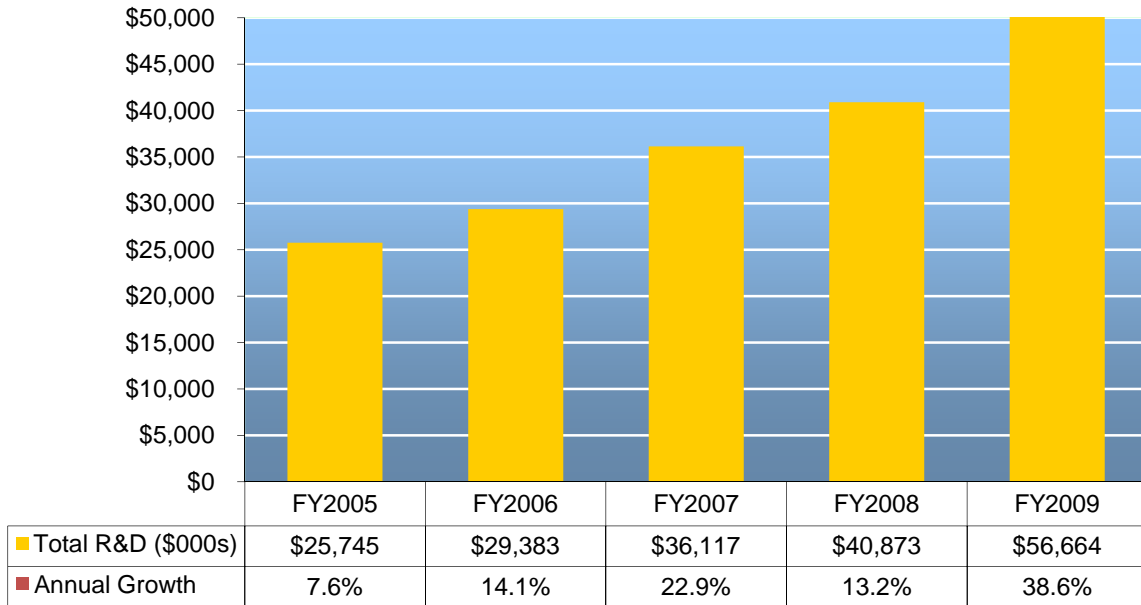


## Total R&D Expenditures FY2009

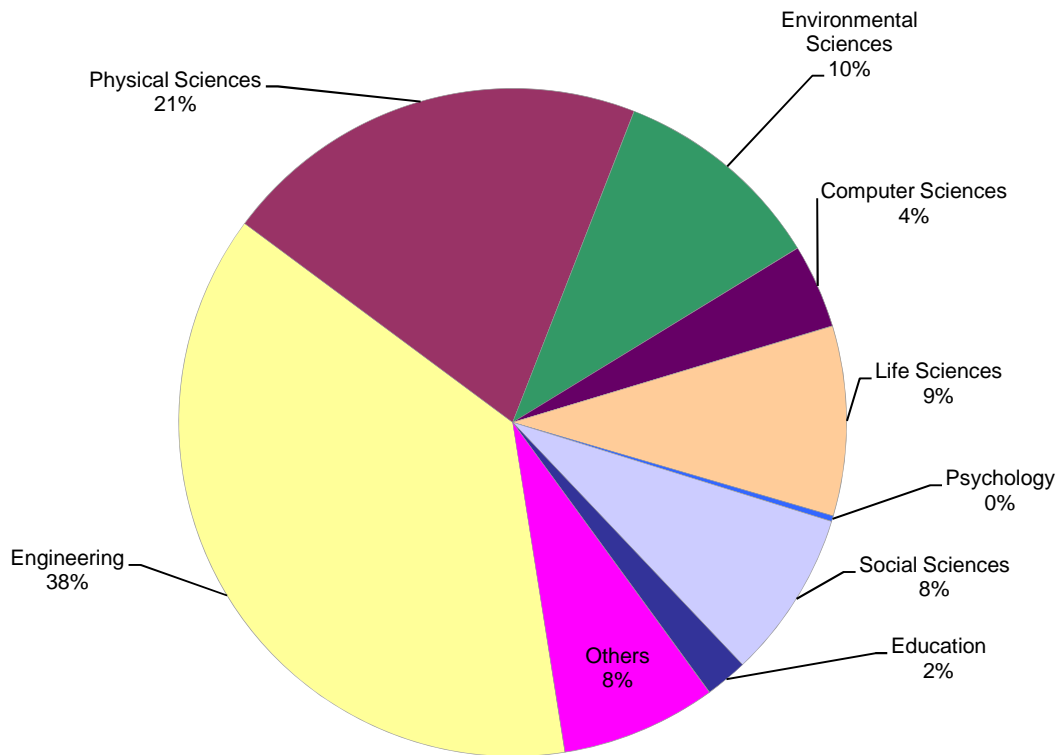


# Lowell

## Total R&D Expenditures FY2005 – FY2009

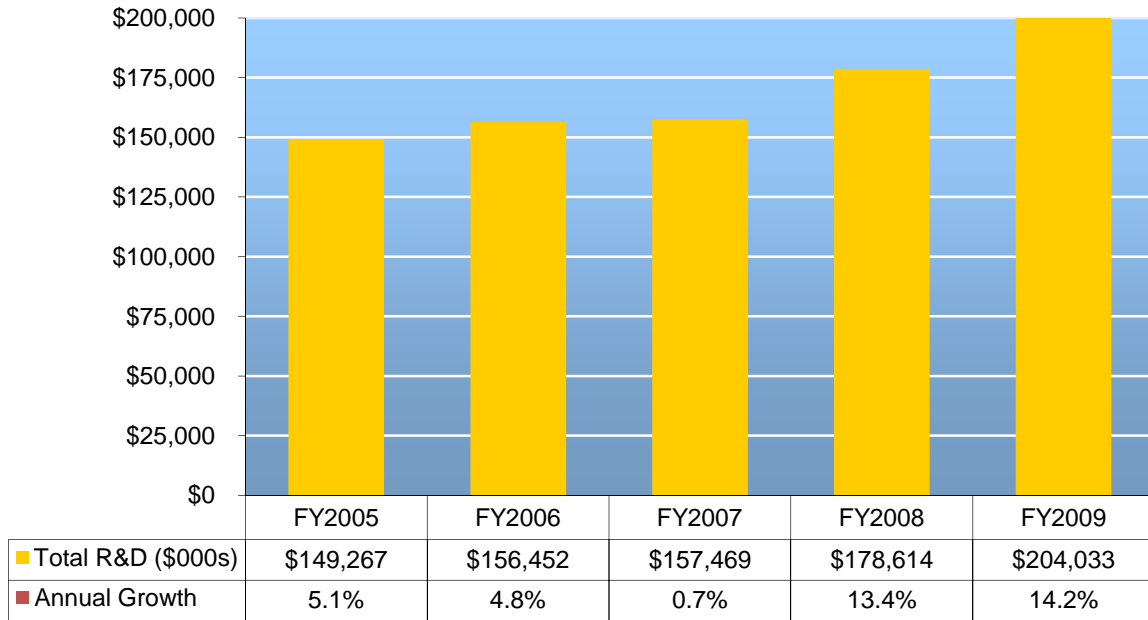


## Total R&D Expenditures FY2009



## Worcester

### Total R&D Expenditures FY2005 – FY2009



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

### Total R&D Expenditures By Field FY2009

| FIELD                                 | UMA<br>FY2009     | % of<br>UMA<br>Total | % of<br>Field | UMB<br>FY2009    | % of<br>UMB<br>Total | % of<br>Field | UMD<br>FY2009    | % of<br>UMD<br>Total | % of<br>Field | UML<br>FY2009    | % of<br>UML<br>Total | % of<br>Field | UMW<br>FY2009     | % of<br>UMW<br>Total | % of<br>Field | System<br>FY2009  | % of<br>Total |
|---------------------------------------|-------------------|----------------------|---------------|------------------|----------------------|---------------|------------------|----------------------|---------------|------------------|----------------------|---------------|-------------------|----------------------|---------------|-------------------|---------------|
| <b>Engineering (Total)</b>            | <b>\$ 50,123</b>  | <b>31.2%</b>         | <b>65.1%</b>  | <b>\$ 209</b>    | <b>0.4%</b>          | <b>0.3%</b>   | <b>\$ 5,325</b>  | <b>25.8%</b>         | <b>6.9%</b>   | <b>\$ 21,341</b> | <b>37.7%</b>         | <b>27.7%</b>  | <b>\$ -</b>       |                      |               | <b>\$ 76,998</b>  | <b>15.7%</b>  |
| Aeronautical & Astronomical           | \$ -              |                      |               | \$ -             |                      |               | \$ -             | 0.0%                 | #DIV/0!       | \$ -             |                      |               | \$ -              |                      |               | \$ -              | 0.0%          |
| Bioengineering/Biomedical             | \$ -              |                      |               | \$ -             |                      |               | \$ 28            | 0.1%                 | 20.6%         | \$ 108           |                      |               | \$ -              |                      |               | \$ 136            | 0.0%          |
| Chemical                              | \$ 20,593         | 12.8%                | 97.1%         | \$ -             |                      |               | \$ -             |                      |               | \$ 620           | 1.1%                 | 2.9%          | \$ -              |                      |               | \$ 21,213         | 4.3%          |
| Civil                                 | \$ 6,607          | 4.1%                 | 76.2%         | \$ -             |                      |               | \$ 808           | 3.9%                 | 9.3%          | \$ 1,253         | 2.2%                 | 14.5%         | \$ -              |                      |               | \$ 8,668          | 1.8%          |
| Electrical                            | \$ 15,267         | 9.5%                 | 76.0%         | \$ 205           | 0.4%                 | 1.0%          | \$ 914           | 4.4%                 | 4.6%          | \$ 3,691         | 6.5%                 | 18.4%         | \$ -              |                      |               | \$ 20,077         | 4.1%          |
| Mechanical                            | \$ 6,982          | 4.3%                 | 61.7%         | \$ -             |                      |               | \$ 598           | 2.9%                 | 5.3%          | \$ 3,737         | 6.6%                 | 33.0%         | \$ -              |                      |               | \$ 11,317         | 2.3%          |
| Metallurgical & Materials             | \$ -              |                      | 0.0%          | \$ -             |                      |               | \$ 890           | 4.3%                 | 20.2%         | \$ 3,516         | 6.2%                 | 79.8%         | \$ -              |                      |               | \$ 4,406          | 0.9%          |
| Other                                 | \$ 674            | 0.4%                 | 6.0%          | \$ 4             | 0.01%                | 0.0%          | \$ 2,087         | 10.1%                | 18.7%         | \$ 8,416         | 14.9%                | 75.3%         | \$ -              |                      |               | \$ 11,181         | 2.3%          |
| <b>Physical Sciences (Total)</b>      | <b>\$ 19,577</b>  | <b>12.2%</b>         | <b>57.3%</b>  | <b>\$ 507</b>    | <b>1.1%</b>          | <b>1.5%</b>   | <b>\$ 2,342</b>  | <b>11.3%</b>         | <b>6.8%</b>   | <b>\$ 11,766</b> | <b>20.8%</b>         | <b>34.4%</b>  | <b>\$ -</b>       |                      |               | <b>\$ 34,192</b>  | <b>7.0%</b>   |
| Astronomy                             | \$ 3,940          | 2.5%                 | 100.0%        | \$ -             |                      |               | \$ -             |                      |               | \$ -             |                      |               | \$ -              |                      |               | \$ 3,940          | 0.8%          |
| Chemistry                             | \$ 9,534          | 5.9%                 | 67.1%         | \$ 355           | 0.8%                 | 2.5%          | \$ 1,937         | 9.4%                 | 13.6%         | \$ 2,382         | 4.2%                 | 16.8%         | \$ -              |                      |               | \$ 14,208         | 2.9%          |
| Physics                               | \$ 6,076          | 3.8%                 | 37.9%         | \$ 152           | 0.3%                 | 0.9%          | \$ 405           | 2.0%                 | 2.5%          | \$ 9,384         | 16.6%                | 58.6%         | \$ -              |                      |               | \$ 16,017         | 3.3%          |
| Other                                 | \$ 27             |                      |               | \$ -             |                      |               | \$ -             |                      |               | \$ -             |                      |               | \$ -              |                      |               | \$ 27             | 0.0%          |
| <b>Environmental Sciences (Total)</b> | <b>\$ 3,543</b>   | <b>2.2%</b>          | <b>16.5%</b>  | <b>\$ 3,919</b>  | <b>8.3%</b>          | <b>18.2%</b>  | <b>\$ 8,183</b>  | <b>39.6%</b>         | <b>38.1%</b>  | <b>\$ 5,856</b>  | <b>10.3%</b>         | <b>27.2%</b>  | <b>\$ -</b>       |                      |               | <b>\$ 21,501</b>  | <b>4.4%</b>   |
| Atmospheric                           | \$ -              |                      |               | \$ -             |                      |               | \$ -             |                      |               | \$ -             |                      |               | \$ -              |                      |               | \$ -              |               |
| Earth Sciences                        | \$ 2,665          | 1.7%                 | 31.2%         | \$ 10            | 0.0%                 | 0.1%          | \$ -             |                      |               | \$ 5,856         | 10.3%                | 68.6%         | \$ -              |                      |               | \$ 8,531          | 1.7%          |
| Oceanography                          | \$ 8              | 0.0%                 | 0.1%          | \$ 2,861         | 6.1%                 | 25.9%         | \$ 8,183         | 39.6%                | 74.0%         | \$ -             |                      |               | \$ -              |                      |               | \$ 11,052         | 2.3%          |
| Other                                 | \$ 870            |                      |               | \$ 1,048         | 2.2%                 | 54.6%         | \$ -             |                      |               | \$ -             |                      |               | \$ -              |                      |               | \$ 1,918          | 0.4%          |
| <b>Mathematical Sciences (Total)</b>  | <b>\$ 2,753</b>   | <b>1.7%</b>          | <b>85.4%</b>  | <b>\$ 16</b>     | <b>0.0%</b>          | <b>0.5%</b>   | <b>\$ 194</b>    | <b>0.9%</b>          | <b>6.0%</b>   | <b>\$ 262</b>    | <b>0.5%</b>          | <b>8.1%</b>   | <b>\$ -</b>       |                      |               | <b>\$ 3,225</b>   | <b>0.7%</b>   |
| <b>Computer Sciences (Total)</b>      | <b>\$ 16,738</b>  | <b>10.4%</b>         | <b>78.8%</b>  | <b>\$ 1,678</b>  | <b>3.6%</b>          | <b>7.9%</b>   | <b>\$ 518</b>    | <b>2.5%</b>          | <b>2.4%</b>   | <b>\$ 2,310</b>  | <b>4.1%</b>          | <b>10.9%</b>  | <b>\$ -</b>       |                      |               | <b>\$ 21,244</b>  | <b>4.3%</b>   |
| <b>Life Sciences (Total)</b>          | <b>\$ 54,733</b>  | <b>34.1%</b>         | <b>19.9%</b>  | <b>\$ 9,237</b>  | <b>19.6%</b>         | <b>3.4%</b>   | <b>\$ 1,286</b>  | <b>6.2%</b>          | <b>0.5%</b>   | <b>\$ 5,206</b>  | <b>9.2%</b>          | <b>1.9%</b>   | <b>\$ 204,033</b> | <b>100.0%</b>        | <b>74.3%</b>  | <b>\$ 274,495</b> | <b>56.1%</b>  |
| Agricultural                          | \$ 23,088         | 14.4%                | 97.8%         | \$ -             |                      |               | \$ 531           | 2.6%                 | 2.2%          | \$ -             |                      |               | \$ -              |                      |               | \$ 23,619         | 4.8%          |
| Biological                            | \$ 23,323         | 14.5%                | 23.0%         | \$ 3,020         | 6.4%                 | 3.0%          | \$ 711           | 3.4%                 | 0.7%          | \$ 1,531         | 2.7%                 | 1.5%          | \$ 72,851         | 35.7%                | 71.8%         | \$ 101,436        | 20.7%         |
| Medical                               | \$ 7,237          | 4.5%                 | 6.3%          | \$ 3,493         | 7.4%                 |               | \$ -             |                      |               | \$ -             |                      |               | \$ 104,417        | 51.2%                | 90.7%         | \$ 115,147        | 23.5%         |
| Other                                 | \$ 1,085          | 0.7%                 | 3.2%          | \$ 2,724         | 5.8%                 | 7.9%          | \$ 44            | 0.2%                 | 0.1%          | \$ 3,675         | 6.5%                 | 10.72%        | \$ 26,765         | 13.1%                | 78.0%         | \$ 34,293         | 7.0%          |
| <b>Psychology (Total)</b>             | <b>\$ 4,157</b>   | <b>2.6%</b>          | <b>31.0%</b>  | <b>\$ 9,049</b>  | <b>19.2%</b>         | <b>67.4%</b>  | <b>\$ 62</b>     | <b>0.3%</b>          | <b>0.5%</b>   | <b>\$ 151</b>    | <b>0.3%</b>          | <b>1.1%</b>   | <b>\$ -</b>       |                      |               | <b>\$ 13,419</b>  | <b>2.7%</b>   |
| <b>Social Sciences (Total)</b>        | <b>\$ 4,592</b>   | <b>2.9%</b>          | <b>23.0%</b>  | <b>\$ 10,544</b> | <b>22.4%</b>         | <b>52.9%</b>  | <b>\$ 183</b>    | <b>0.9%</b>          | <b>0.9%</b>   | <b>\$ 4,606</b>  | <b>8.1%</b>          | <b>23.1%</b>  | <b>\$ -</b>       |                      |               | <b>\$ 19,925</b>  | <b>4.1%</b>   |
| Economics                             | \$ 1,615          | 1.0%                 | 57.9%         | \$ 1,155         | 2.5%                 | 41.4%         | \$ -             | 0.0%                 | 0.0%          | \$ 17            | 0.0%                 | 0.6%          | \$ -              |                      |               | \$ 2,787          | 0.6%          |
| Political Science                     | \$ 862            | 0.5%                 | 22.3%         | \$ 3,000         | 6.4%                 | 77.5%         | \$ 11            | 0.1%                 | 0.3%          | \$ -             | 0.0%                 | 0.0%          | \$ -              |                      |               | \$ 3,873          | 0.8%          |
| Sociology                             | \$ 1,285          | 0.8%                 | 58.6%         | \$ 856           | 1.8%                 | 39.1%         | \$ 49            | 0.2%                 | 2.2%          | \$ 1             | 0.0%                 | 0.0%          | \$ -              |                      |               | \$ 2,191          | 0.4%          |
| Other                                 | \$ 830            | 0.5%                 | 7.5%          | \$ 5,533         | 11.8%                | 50.0%         | \$ 123           | 0.6%                 | 1.1%          | \$ 4,588         | 8.1%                 | 41.4%         | \$ -              |                      |               | \$ 11,074         | 2.3%          |
| <b>Other Sciences (Total)</b>         | <b>\$ -</b>       |                      |               | <b>\$ 1,478</b>  | <b>3.1%</b>          | <b>40.4%</b>  | <b>\$ 1,250</b>  | <b>6.0%</b>          | <b>34.1%</b>  | <b>\$ 933</b>    | <b>1.6%</b>          | <b>25.5%</b>  | <b>\$ -</b>       |                      |               | <b>\$ 3,661</b>   | <b>0.7%</b>   |
| <b>TOTAL, SCI &amp; ENG FIELDS</b>    | <b>\$ 156,216</b> | <b>97.2%</b>         | <b>33.3%</b>  | <b>\$ 36,637</b> | <b>77.9%</b>         | <b>7.8%</b>   | <b>\$ 19,343</b> | <b>93.6%</b>         | <b>4.1%</b>   | <b>\$ 52,431</b> | <b>92.5%</b>         | <b>11.2%</b>  | <b>\$ 204,033</b> | <b>100.0%</b>        | <b>43.5%</b>  | <b>\$ 468,660</b> | <b>95.8%</b>  |

### Total R&D Expenditures By Field FY2009

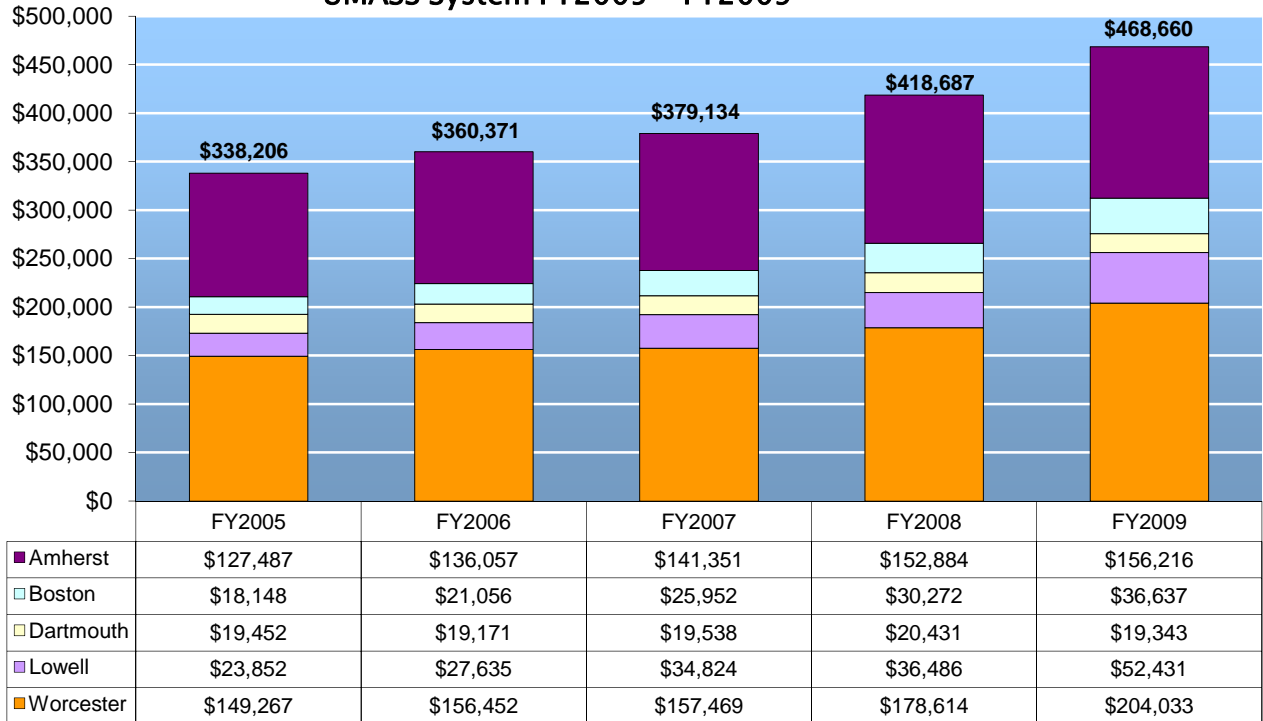
| FIELD                                  | UMA<br>FY2009     | % of<br>UMA<br>Total | % of<br>Field | UMB<br>FY2009    | % of<br>UMB<br>Total | % of<br>Field | UMD<br>FY2009    | % of<br>UMD<br>Total | % of<br>Field | UML<br>FY2009    | % of<br>UML<br>Total | % of<br>Field | UMW<br>FY2009     | % of<br>UMW<br>Total | % of<br>Field | System<br>FY2009  | % of<br>Total |
|--|-------------------|----------------------|---------------|------------------|----------------------|---------------|------------------|----------------------|---------------|------------------|----------------------|---------------|-------------------|----------------------|---------------|-------------------|---------------|
| Education                              | \$ 3,246          | 2.0%                 | 30.6%         | \$ 4,919         | 10.5%                | 46.3%         | \$ 1,288         | 6.2%                 | 12.1%         | \$ 1,165         | 2.1%                 | 11.0%         | \$ -              |                      |               | \$ 10,618         | 2.2%          |
| Law                                    | \$ 155            | 0.1%                 | 100.0%        | \$ -             | 0.0%                 | 0.0%          | \$ -             |                      |               | \$ -             | 0.0%                 | 0.0%          | \$ -              |                      |               | \$ 155            | 0.0%          |
| Humanities                             | \$ 239            | 0.1%                 | 11.7%         | \$ 679           | 1.4%                 | 33.3%         | \$ 10            | 0.0%                 | 0.5%          | \$ 1,109         |                      |               | \$ -              |                      |               | \$ 2,037          | 0.4%          |
| Visual and Performing Arts             | \$ 20             | 0.0%                 | 29.0%         | \$ 34            | 0.1%                 | 49.3%         | \$ 8             | 0.0%                 | 11.6%         | \$ 7             | 0.01%                | 10.1%         | \$ -              |                      |               | \$ 69             | 0.01%         |
| Business and Management                | \$ 680            | 0.4%                 | 41.7%         | \$ 577           | 1.2%                 | 35.4%         | \$ 19            | 0.1%                 | 1.2%          | \$ 355           | 0.6%                 | 21.8%         | \$ -              |                      |               | \$ 1,631          | 0.3%          |
| Comm., Journalism & Library Sci        | \$ 110            |                      | 84.6%         | \$ 12            | 0.0%                 | 9.2%          | \$ -             |                      | 0.0%          | \$ 8             | 0.0%                 | 6.2%          | \$ -              |                      |               | \$ 130            | 0.0%          |
| Social Work                            | \$ -              |                      | 0.0%          | \$ 42            |                      | 100.0%        | \$ -             |                      | 0.0%          | \$ -             |                      | 0.0%          | \$ -              |                      |               | \$ 42             |               |
| Other Non-Science and Engin.           | \$ -              |                      | 0.0%          | \$ 4,128         | 8.8%                 | 72.2%         | \$ 1             | 0.0%                 | 0.0%          | \$ 1,589         | 2.8%                 | 27.8%         | \$ -              |                      |               | \$ 5,718          | 1.2%          |
| <b>TOTAL, NON-SCI &amp; ENG FIELDS</b> | <b>\$ 4,450</b>   | <b>2.8%</b>          | <b>21.8%</b>  | <b>\$ 10,391</b> | <b>22.1%</b>         | <b>50.9%</b>  | <b>\$ 1,326</b>  | <b>6.4%</b>          | <b>6.5%</b>   | <b>\$ 4,233</b>  | <b>7.5%</b>          | <b>20.8%</b>  | <b>\$ -</b>       |                      |               | <b>\$ 20,400</b>  | <b>4.2%</b>   |
| <b>TOTAL, SCI &amp; ENG FIELDS</b>     | <b>\$ 156,216</b> | <b>97.2%</b>         | <b>33.3%</b>  | <b>\$ 36,637</b> | <b>77.9%</b>         | <b>7.8%</b>   | <b>\$ 19,343</b> | <b>93.6%</b>         | <b>4.1%</b>   | <b>\$ 52,431</b> | <b>92.5%</b>         | <b>11.2%</b>  | <b>\$ 204,033</b> | <b>100.0%</b>        | <b>43.5%</b>  | <b>\$ 468,660</b> | <b>95.8%</b>  |
| <b>GRAND TOTAL</b>                     | <b>\$ 160,666</b> |                      | <b>32.9%</b>  | <b>\$ 47,028</b> |                      | <b>9.6%</b>   | <b>\$ 20,669</b> |                      | <b>4.2%</b>   | <b>\$ 56,664</b> |                      | <b>11.6%</b>  | <b>\$ 204,033</b> |                      | <b>41.7%</b>  | <b>\$ 489,060</b> | <b>100.0%</b> |

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

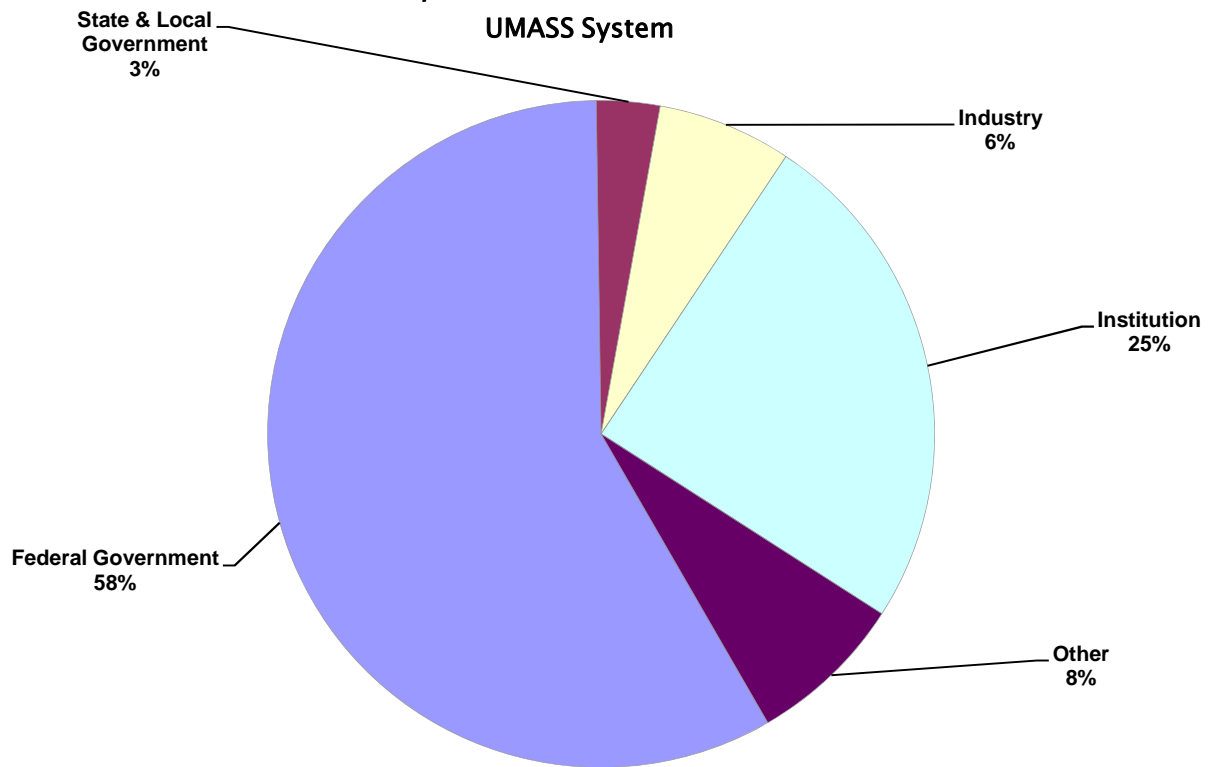
Note: % of Total is the percentage each field represents of total campus or system R&D expenditures in all fields.

% of Field is the percentage of the UMass system's expenditures in a particular field represented by that campus.

## Science and Engineering R&D Expenditures UMASS System FY2005 – FY2009



## Science and Engineering R&D Expenditures by Source of Funds FY2009 UMASS System



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

**Science and Engineering R&D Expenditures by Source  
FY2005 – FY2009**

|               | Total R&D Expenditures |                  |                  |                  |                  |                              |              |                              |              |
|---------------|------------------------|------------------|------------------|------------------|------------------|------------------------------|--------------|------------------------------|--------------|
|               | FY05                   | FY06             | FY07             | FY08             | FY09             | 5-Year Change<br>FY05 - FY09 |              | 1-Year Change<br>FY08 - FY09 |              |
|               |                        |                  |                  |                  |                  | \$                           | %            | \$                           | %            |
| Amherst       | \$127,487              | \$136,057        | \$141,351        | \$152,884        | \$156,216        | \$28,729                     | 22.5%        | \$3,332                      | 2.2%         |
| Boston        | \$18,148               | \$21,056         | \$25,952         | \$30,272         | \$36,637         | \$18,489                     | 101.9%       | \$6,365                      | 21.0%        |
| Dartmouth     | \$19,452               | \$19,171         | \$19,538         | \$20,431         | \$19,343         | -\$109                       | -0.6%        | -\$1,088                     | -5.3%        |
| Lowell        | \$23,852               | \$27,635         | \$34,824         | \$36,486         | \$52,431         | \$28,579                     | 119.8%       | \$15,945                     | 43.7%        |
| Worcester     | \$149,267              | \$156,452        | \$157,469        | \$178,614        | \$204,033        | \$54,766                     | 36.7%        | \$25,419                     | 14.2%        |
| <b>System</b> | <b>\$338,206</b>       | <b>\$360,371</b> | <b>\$379,134</b> | <b>\$418,687</b> | <b>\$468,660</b> | <b>\$130,454</b>             | <b>38.6%</b> | <b>\$49,973</b>              | <b>11.9%</b> |

|               | Federal R&D Expenditures |                  |                  |                  |                  |                              |              |                              |             |
|---------------|--------------------------|------------------|------------------|------------------|------------------|------------------------------|--------------|------------------------------|-------------|
|               | FY05                     | FY06             | FY07             | FY08             | FY09             | 5-Year Change<br>FY05 - FY09 |              | 1-Year Change<br>FY08 - FY09 |             |
|               |                          |                  |                  |                  |                  | \$                           | %            | \$                           | %           |
| Amherst       | \$66,921                 | \$69,642         | \$71,974         | \$79,736         | \$80,163         | \$13,242                     | 19.8%        | \$427                        | 0.5%        |
| Boston        | \$6,326                  | \$8,610          | \$9,152          | \$12,001         | \$13,536         | \$7,210                      | 114.0%       | \$1,535                      | 12.8%       |
| Dartmouth     | \$9,852                  | \$9,515          | \$11,456         | \$13,087         | \$9,667          | -\$185                       | -1.9%        | -\$3,420                     | -26.1%      |
| Lowell        | \$17,608                 | \$18,741         | \$20,045         | \$22,406         | \$23,083         | \$5,475                      | 31.1%        | \$677                        | 3.0%        |
| Worcester     | \$130,680                | \$136,141        | \$131,226        | \$145,113        | \$145,834        | \$15,154                     | 11.6%        | \$721                        | 0.5%        |
| <b>System</b> | <b>\$231,387</b>         | <b>\$242,649</b> | <b>\$243,853</b> | <b>\$272,343</b> | <b>\$272,283</b> | <b>\$40,896</b>              | <b>17.7%</b> | <b>-\$60</b>                 | <b>0.0%</b> |

|               | State & Local Government R&D Expenditures |                 |                 |                |                 |                              |              |                              |              |
|---------------|---|-----------------|-----------------|----------------|-----------------|------------------------------|--------------|------------------------------|--------------|
|               | FY05                                      | FY06            | FY07            | FY08           | FY09            | 5-Year Change<br>FY05 - FY09 |              | 1-Year Change<br>FY08 - FY09 |              |
|               |   |                 |                 |                |                 | \$                           | %            | \$                           | %            |
| Amherst       | \$3,873                                   | \$5,684         | \$5,638         | \$4,699        | \$5,439         | \$1,566                      | 40.4%        | \$740                        | 15.7%        |
| Boston        | \$2,481                                   | \$1,662         | \$1,207         | \$701          | \$949           | -\$1,532                     | -61.7%       | \$248                        | 35.4%        |
| Dartmouth     | \$5,039                                   | \$5,069         | \$2,210         | \$1,641        | \$1,312         | -\$3,727                     | -74.0%       | -\$329                       | -20.0%       |
| Lowell        | \$180                                     | \$601           | \$969           | \$1,088        | \$1,466         | \$1,286                      | 714.4%       | \$378                        | 34.7%        |
| Worcester     | \$139                                     | \$35            | \$0             | \$895          | \$5,265         | \$5,126                      | 3687.8%      | \$4,370                      | 488.3%       |
| <b>System</b> | <b>\$11,712</b>                           | <b>\$13,051</b> | <b>\$10,024</b> | <b>\$9,024</b> | <b>\$14,431</b> | <b>\$2,719</b>               | <b>23.2%</b> | <b>\$5,407</b>               | <b>59.9%</b> |

**Science and Engineering R&D Expenditures by Source  
FY2005 – FY2009**

|               | Industry-Sponsored R&D Expenditures |                 |                 |                 |                 |                              |              |                              |              |
|---------------|-------------------------------------|-----------------|-----------------|-----------------|-----------------|------------------------------|--------------|------------------------------|--------------|
|               | FY05                                | FY06            | FY07            | FY08            | FY09            | 5-Year Change<br>FY05 - FY09 |              | 1-Year Change<br>FY08 - FY09 |              |
|               |                                     |                 |                 |                 |                 | \$                           | %            | \$                           | %            |
| Amherst       | \$4,724                             | \$5,934         | \$5,195         | \$8,182         | \$8,505         | \$3,781                      | 80.0%        | \$323                        | 3.9%         |
| Boston        | \$0                                 | \$0             | \$275           | \$552           | \$333           | \$333                        | NA           | -\$219                       | -39.7%       |
| Dartmouth     | \$1,252                             | \$1,680         | \$762           | \$807           | \$816           | -\$436                       | -34.8%       | \$9                          | 1.1%         |
| Lowell        | \$4,755                             | \$4,423         | \$5,222         | \$6,299         | \$6,772         | \$2,017                      | 42.4%        | \$473                        | 7.5%         |
| Worcester     | \$8,018                             | \$9,465         | \$16,266        | \$15,192        | \$14,090        | \$6,072                      | 75.7%        | -\$1,102                     | -7.3%        |
| <b>System</b> | <b>\$18,749</b>                     | <b>\$21,502</b> | <b>\$27,720</b> | <b>\$31,032</b> | <b>\$30,516</b> | <b>\$11,767</b>              | <b>62.8%</b> | <b>-\$516</b>                | <b>-1.7%</b> |

|               | Institutional R&D Expenditures |                 |                 |                 |                  |                              |               |                              |              |
|---------------|--------------------------------|-----------------|-----------------|-----------------|------------------|------------------------------|---------------|------------------------------|--------------|
|               | FY05                           | FY06            | FY07            | FY08            | FY09             | 5-Year Change<br>FY05 - FY09 |               | 1-Year Change<br>FY08 - FY09 |              |
|               |                                |                 |                 |                 |                  | \$                           | %             | \$                           | %            |
| Amherst       | \$42,887                       | \$45,773        | \$48,755        | \$49,556        | \$50,647         | \$7,760                      | 18.1%         | \$1,091                      | 2.2%         |
| Boston        | \$6,731                        | \$7,007         | \$11,122        | \$13,048        | \$15,993         | \$9,262                      | 137.6%        | \$2,945                      | 22.6%        |
| Dartmouth     | \$3,305                        | \$2,907         | \$4,855         | \$4,253         | \$7,164          | \$3,859                      | 116.8%        | \$2,911                      | 68.4%        |
| Lowell        | \$1,309                        | \$3,870         | \$8,588         | \$6,693         | \$21,110         | \$19,801                     | 1512.7%       | \$14,417                     | 215.4%       |
| Worcester     | \$1,583                        | \$2,377         | \$1,385         | \$2,626         | \$20,916         | \$19,333                     | 1221.3%       | \$18,290                     | 696.5%       |
| <b>System</b> | <b>\$55,815</b>                | <b>\$61,934</b> | <b>\$74,705</b> | <b>\$76,176</b> | <b>\$115,830</b> | <b>\$60,015</b>              | <b>107.5%</b> | <b>\$39,654</b>              | <b>52.1%</b> |

|               | Other R&D Expenditures |                 |                 |                 |                 |                              |              |                              |              |
|---------------|------------------------|-----------------|-----------------|-----------------|-----------------|------------------------------|--------------|------------------------------|--------------|
|               | FY05                   | FY06            | FY07            | FY08            | FY09            | 5-Year Change<br>FY05 - FY09 |              | 1-Year Change<br>FY08 - FY09 |              |
|               |                        |                 |                 |                 |                 | \$                           | %            | \$                           | %            |
| Amherst       | \$9,082                | \$9,024         | \$9,789         | \$10,711        | \$11,462        | \$2,380                      | 26.2%        | \$751                        | 7.0%         |
| Boston        | \$2,610                | \$3,777         | \$4,196         | \$3,970         | \$5,826         | \$3,216                      | 123.2%       | \$1,856                      | 46.8%        |
| Dartmouth     | \$4                    | \$0             | \$255           | \$643           | \$384           | \$380                        | 9500.0%      | -\$259                       | -40.3%       |
| Lowell        | \$0                    | \$0             | \$0             | \$0             | \$0             | \$0                          | NA           | \$0                          | NA           |
| Worcester     | \$8,847                | \$8,434         | \$8,592         | \$14,788        | \$17,928        | \$9,081                      | 102.6%       | \$3,140                      | 21.2%        |
| <b>System</b> | <b>\$20,543</b>        | <b>\$21,235</b> | <b>\$22,832</b> | <b>\$30,112</b> | <b>\$35,600</b> | <b>\$15,057</b>              | <b>73.3%</b> | <b>\$5,488</b>               | <b>18.2%</b> |

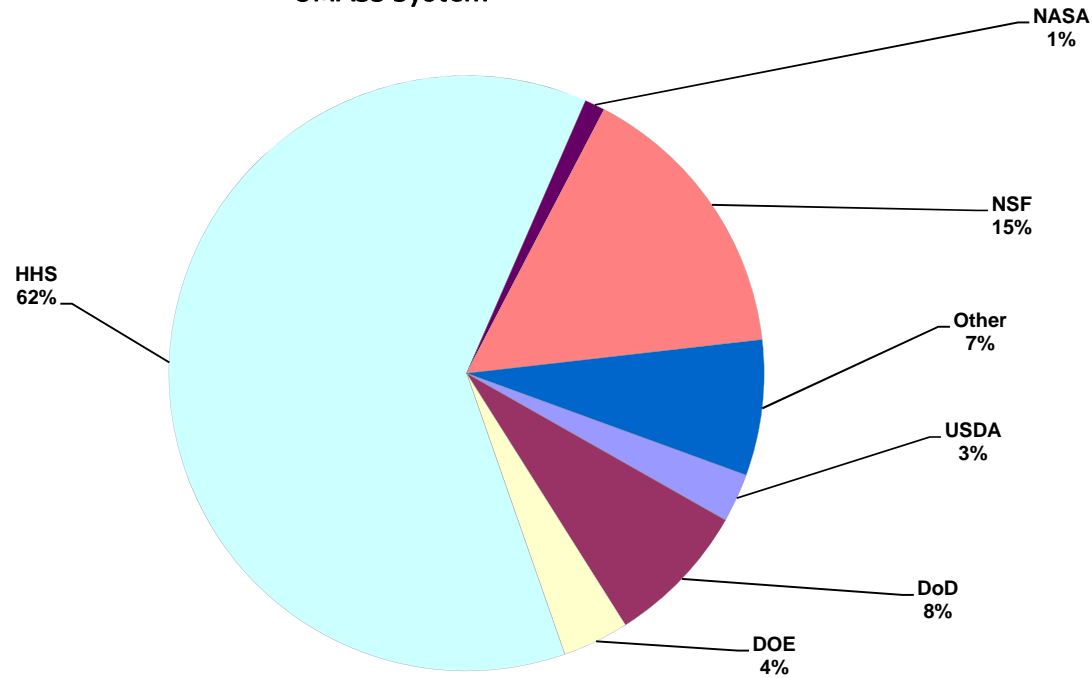
Source: Campus NSF surveys. All dollars are in thousands.

## Science and Engineering R&D Expenditures Percent Basic Research FY2009

| FY09 Basic Research as a Percent of: |             |           |
|--------------------------------------|-------------|-----------|
|                                      | Federal R&D | Total R&D |
| <b>Amherst</b>                       | 70%         | 70%       |
| <b>Boston</b>                        | 55%         | 53%       |
| <b>Dartmouth</b>                     | 94%         | 89%       |
| <b>Lowell</b>                        | 74%         | 74%       |
| <b>Worcester</b>                     | 66%         | 49%       |

Source: Campus NSF surveys.

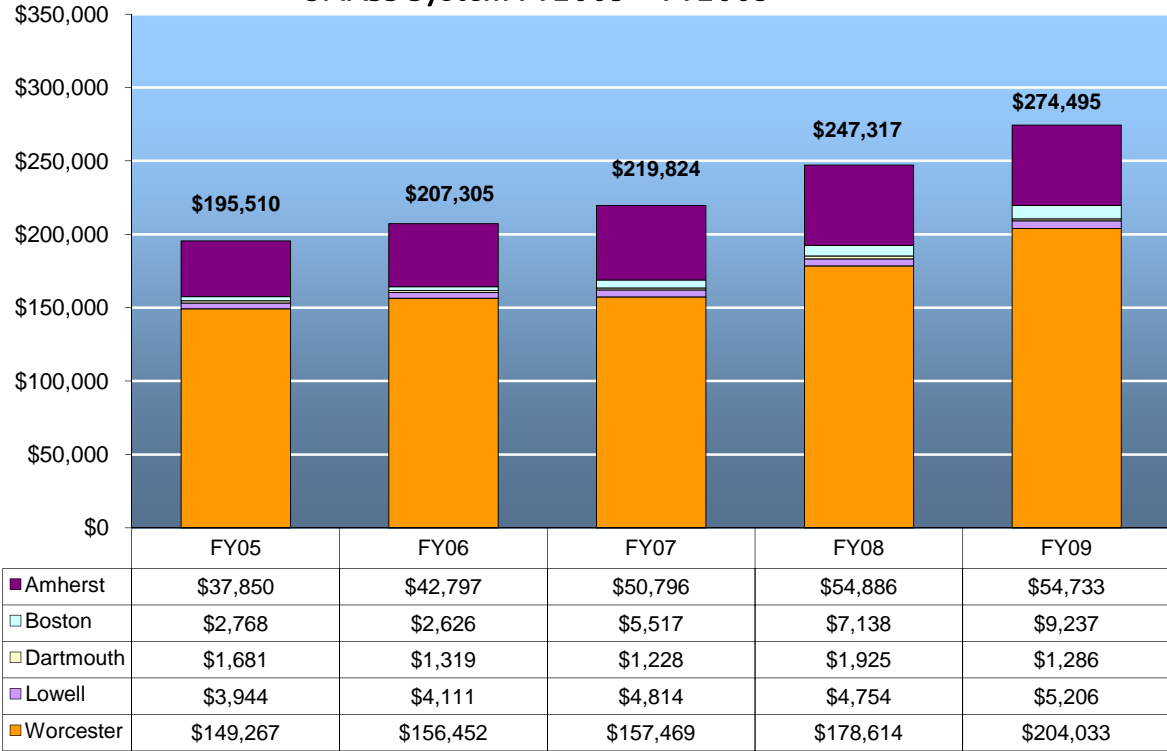
**Science and Engineering R&D Expenditures  
by Federal Government Agency Sources FY2009  
UMASS System**



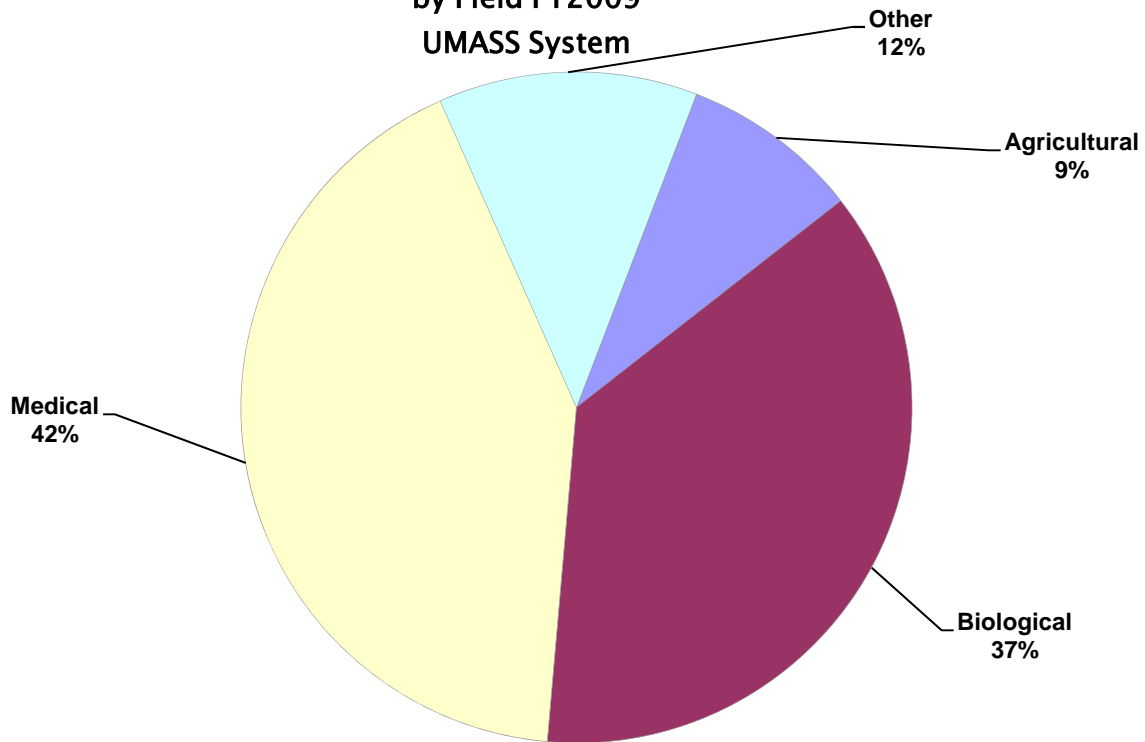
|                  | Total Federal \$ | USDA     | % of Campus Total | DoD       | % of Campus Total | DOE      | % of Campus Total | HHS        | % of Campus Total | NASA     | % of Campus Total | NSF       | % of Campus Total | Other     | % of Campus Total |
|------------------|------------------|----------|-------------------|-----------|-------------------|----------|-------------------|------------|-------------------|----------|-------------------|-----------|-------------------|-----------|-------------------|
| <b>Amherst</b>   | \$ 80,163        | \$ 6,559 | 8.2%              | \$ 8,330  | 10.4%             | \$ 7,737 | 9.7%              | \$ 17,637  | 22.0%             | \$ 1,856 | 2.3%              | \$ 33,945 | 42.3%             | \$ 4,099  | 5.1%              |
| <b>Boston</b>    | \$ 13,536        | \$ 23    | 0.2%              | \$ 138    | 1.0%              | \$ 87    | 0.6%              | \$ 2,606   | 19.3%             | \$ 46    | 0.3%              | \$ 2,368  | 17.5%             | \$ 8,268  | 61.1%             |
| <b>Dartmouth</b> | \$ 9,667         | \$ 639   | 6.6%              | \$ 1,775  | 18.4%             | \$ -     | 0.0%              | \$ 703     | 7.3%              | \$ 127   | 1.3%              | \$ 1,449  | 15.0%             | \$ 4,974  | 51.5%             |
| <b>Lowell</b>    | \$ 23,083        | \$ -     | 0.0%              | \$ 11,097 | 48.1%             | \$ 460   | 2.0%              | \$ 4,993   | 21.6%             | \$ 350   | 1.5%              | \$ 4,128  | 17.9%             | \$ 2,055  | 8.9%              |
| <b>Worcester</b> | \$ 145,834       | \$ -     | 0.0%              | \$ -      | 0.0%              | \$ 1,513 | 1.0%              | \$ 142,603 | 97.8%             | \$ 617   | 0.4%              | \$ 438    | 0.3%              | \$ 663    | 0.5%              |
| <b>System</b>    | \$ 272,283       | \$ 7,221 | 2.7%              | \$ 21,340 | 7.8%              | \$ 9,797 | 3.6%              | \$ 168,542 | 61.9%             | \$ 2,996 | 1.1%              | \$ 42,328 | 15.5%             | \$ 20,059 | 7.4%              |

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

### Life Sciences R&D Expenditures UMASS System FY2005 – FY2009



### Life Sciences R&D Expenditures by Field FY2009 UMASS System



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

**Life Sciences R&D Expenditures by Field  
FY2005 – FY2009**

|                  | Life Sciences R&D Expenditures |                  |                  |                  |                  |                              |              |                              |              |
|------------------|--------------------------------|------------------|------------------|------------------|------------------|------------------------------|--------------|------------------------------|--------------|
|                  | FY05                           | FY06             | FY07             | FY08             | FY09             | 5-Year Change<br>FY05 - FY09 |              | 1-Year Change<br>FY08 - FY09 |              |
|                  |                                |                  |                  |                  |                  | \$                           | %            | \$                           | %            |
| <b>Amherst</b>   | \$37,850                       | \$42,797         | \$50,796         | \$54,886         | \$54,733         | \$16,883                     | 44.6%        | -\$153                       | -0.3%        |
| <b>Boston</b>    | \$2,768                        | \$2,626          | \$5,517          | \$7,138          | \$9,237          | \$6,469                      | 233.7%       | \$2,099                      | 29.4%        |
| <b>Dartmouth</b> | \$1,681                        | \$1,319          | \$1,228          | \$1,925          | \$1,286          | -\$395                       | -23.5%       | -\$639                       | -33.2%       |
| <b>Lowell</b>    | \$3,944                        | \$4,111          | \$4,814          | \$4,754          | \$5,206          | \$1,262                      | 32.0%        | \$452                        | 9.5%         |
| <b>Worcester</b> | \$149,267                      | \$156,452        | \$157,469        | \$178,614        | \$204,033        | \$54,766                     | 36.7%        | \$25,419                     | 14.2%        |
| <b>System</b>    | <b>\$195,510</b>               | <b>\$207,305</b> | <b>\$219,824</b> | <b>\$247,317</b> | <b>\$274,495</b> | <b>\$78,985</b>              | <b>40.4%</b> | <b>\$27,178</b>              | <b>11.0%</b> |

|                  | Agricultural    |                 |                 |                 |                 |                              |              |                              |              |
|------------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------------------|--------------|------------------------------|--------------|
|                  | FY05            | FY06            | FY07            | FY08            | FY09            | 5-Year Change<br>FY05 - FY09 |              | 1-Year Change<br>FY08 - FY09 |              |
|                  |                 |                 |                 |                 |                 | \$                           | %            | \$                           | %            |
| <b>Amherst</b>   | \$17,017        | \$19,183        | \$20,795        | \$24,478        | \$23,088        | \$6,071                      | 35.7%        | -\$1,390                     | -5.7%        |
| <b>Boston</b>    | \$0             | \$0             | \$0             | \$0             | \$0             | \$0                          |              | \$0                          |              |
| <b>Dartmouth</b> | \$1,180         | \$744           | \$739           | \$602           | \$531           | -\$649                       | -55.0%       | -\$71                        | -11.8%       |
| <b>Lowell</b>    | \$0             | \$0             | \$0             | \$0             | \$0             | \$0                          |              | \$0                          |              |
| <b>Worcester</b> | \$0             | \$0             | \$0             | \$0             | \$0             | \$0                          |              | \$0                          |              |
| <b>System</b>    | <b>\$18,197</b> | <b>\$19,927</b> | <b>\$21,534</b> | <b>\$25,080</b> | <b>\$23,619</b> | <b>\$5,422</b>               | <b>29.8%</b> | <b>-\$1,461</b>              | <b>-5.8%</b> |

|                  | Biological      |                 |                 |                 |                  |                              |              |                              |             |
|------------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------------------|--------------|------------------------------|-------------|
|                  | FY05            | FY06            | FY07            | FY08            | FY09             | 5-Year Change<br>FY05 - FY09 |              | 1-Year Change<br>FY08 - FY09 |             |
|                  |                 |                 |                 |                 |                  | \$                           | %            | \$                           | %           |
| <b>Amherst</b>   | \$16,309        | \$17,996        | \$22,757        | \$22,823        | \$23,323         | \$7,014                      | 43.0%        | \$500                        | 2.2%        |
| <b>Boston</b>    | \$1,417         | \$1,439         | \$2,345         | \$3,384         | \$3,020          | \$1,603                      | 113.1%       | -\$364                       | -10.8%      |
| <b>Dartmouth</b> | \$190           | \$263           | \$465           | \$970           | \$711            | \$521                        | 274.2%       | -\$259                       | -26.7%      |
| <b>Lowell</b>    | \$1,036         | \$885           | \$1,378         | \$1,477         | \$1,531          | \$495                        | 47.8%        | \$54                         | 3.7%        |
| <b>Worcester</b> | \$58,543        | \$61,571        | \$56,562        | \$63,980        | \$72,851         | \$14,308                     | 24.4%        | \$8,871                      | 13.9%       |
| <b>System</b>    | <b>\$77,495</b> | <b>\$82,154</b> | <b>\$83,507</b> | <b>\$92,634</b> | <b>\$101,436</b> | <b>\$23,941</b>              | <b>30.9%</b> | <b>\$8,802</b>               | <b>9.5%</b> |

**Life Sciences R&D Expenditures by Field  
FY2005 – FY2009**

|                  | <b>Medical</b>  |                 |                 |                  |                  |                              |              |                              |              |
|------------------|-----------------|-----------------|-----------------|------------------|------------------|------------------------------|--------------|------------------------------|--------------|
|                  | FY05            | FY06            | FY07            | FY08             | FY09             | 5-Year Change<br>FY05 - FY09 |              | 1-Year Change<br>FY08 - FY09 |              |
|                  |                 |                 |                 |                  |                  | \$                           | %            | \$                           | %            |
| <b>Amherst</b>   | \$1,804         | \$3,191         | \$5,401         | \$6,575          | \$7,237          | \$5,433                      | 301.2%       | \$662                        | 10.1%        |
| <b>Boston</b>    | \$0             | \$0             | \$2,984         | \$2,934          | \$3,493          | \$3,493                      |              | \$559                        | 19.1%        |
| <b>Dartmouth</b> | \$0             | \$0             | \$0             | \$0              | \$0              | \$0                          |              | \$0                          |              |
| <b>Lowell</b>    | \$2,886         | \$0             | \$0             | \$0              | \$0              | -\$2,886                     | -100.0%      | \$0                          |              |
| <b>Worcester</b> | \$69,314        | \$76,250        | \$82,470        | \$93,501         | \$104,417        | \$35,103                     | 50.6%        | \$10,916                     | 11.7%        |
| <b>System</b>    | <b>\$74,004</b> | <b>\$79,441</b> | <b>\$90,855</b> | <b>\$103,010</b> | <b>\$115,147</b> | <b>\$41,143</b>              | <b>55.6%</b> | <b>\$12,137</b>              | <b>11.8%</b> |

|                  | <b>Other Life Sciences</b> |                 |                 |                 |                 |                              |              |                              |              |
|------------------|----------------------------|-----------------|-----------------|-----------------|-----------------|------------------------------|--------------|------------------------------|--------------|
|                  | FY05                       | FY06            | FY07            | FY08            | FY09            | 5-Year Change<br>FY05 - FY09 |              | 1-Year Change<br>FY08 - FY09 |              |
|                  |                            |                 |                 |                 |                 | \$                           | %            | \$                           | %            |
| <b>Amherst</b>   | \$2,720                    | \$2,427         | \$1,843         | \$1,010         | \$1,085         | -\$1,342                     | -55.3%       | \$75                         | 7.4%         |
| <b>Boston</b>    | \$1,351                    | \$1,187         | \$188           | \$820           | \$2,724         | \$1,537                      | 129.5%       | \$1,904                      | 232.2%       |
| <b>Dartmouth</b> | \$311                      | \$312           | \$24            | \$353           | \$44            | -\$268                       | -85.9%       | -\$309                       | -87.5%       |
| <b>Lowell</b>    | \$22                       | \$3,226         | \$3,436         | \$3,277         | \$3,675         | \$449                        | 13.9%        | \$398                        | 12.1%        |
| <b>Worcester</b> | \$ 21,410                  | \$18,631        | \$18,437        | \$21,133        | \$26,765        | \$8,134                      | 43.7%        | \$5,632                      | 26.7%        |
| <b>System</b>    | <b>\$ 25,814</b>           | <b>\$25,783</b> | <b>\$23,928</b> | <b>\$26,593</b> | <b>\$34,293</b> | <b>\$8,510</b>               | <b>33.0%</b> | <b>\$7,700</b>               | <b>29.0%</b> |

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