

FOUR CAMPUSES UNITED  
**ALL FOUR: COLORADO**

# Cost and Value of Research

Board of Regents Meeting

September 8, 2016

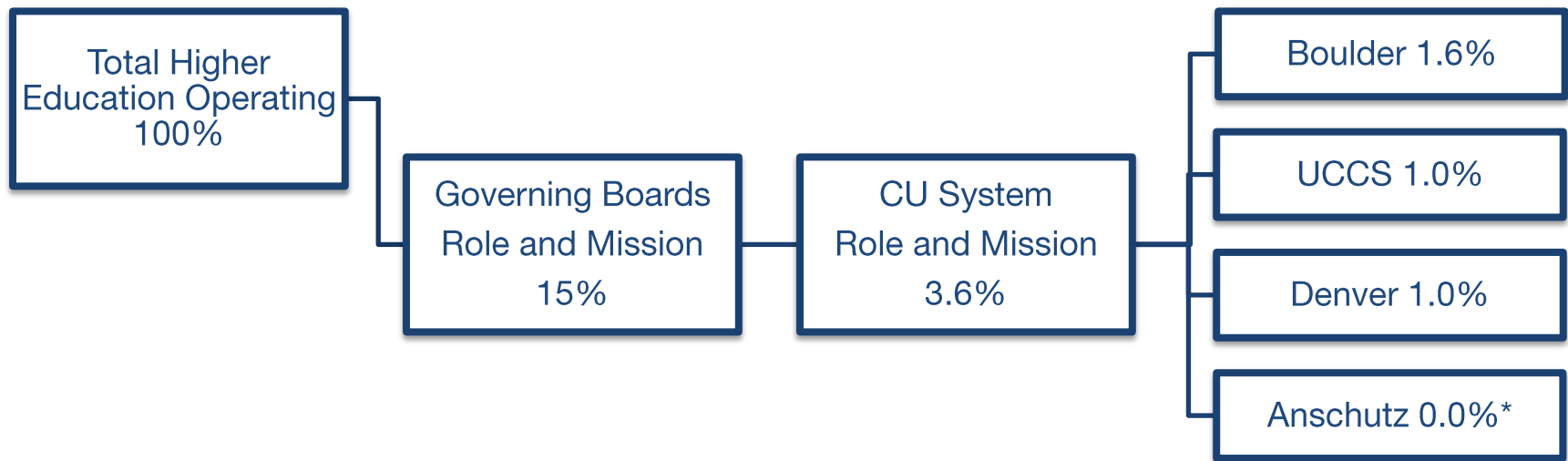


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# Research Component of State Funding Model

- There are no dollars specifically designated for research in the state funding formula for higher education.
- The current state funding model allocates a flat amount to each governing board based a number of factors including enrollment, location, and role and mission.



\*Funded as specialty education program, no role and mission funding.



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# How does CU compare?

## NSF Rank for All Sponsors, Institutional Expenditure vs. Total Expenditure

NSF FY2014 Higher Education Research and Development, (HERD), Survey					
Campus	Total Research Funds	Portion of Research Funds from Institution		Total Research Spending Rank	Institution Research Spending Rank
		Amount	Percent		
Top 100 Institutions	\$52,946,375,000	\$11,990,357,000	22.60%	n/a	n/a
Denver Anschutz	\$411,020,000	\$28,334,000	6.90%	54	143
Boulder	\$379,475,000	\$31,985,000	8.40%	58	129
UCCS	\$5,363,000	\$450,000	8.40%	384	476

[https://ncesdata.nsf.gov/herd/2014/html/HERD2014\\_DST\\_18.html](https://ncesdata.nsf.gov/herd/2014/html/HERD2014_DST_18.html)



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# Anschutz Medical Campus



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# CU Anschutz Campus Overview

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- In FY 2016 research awards at the CU Anschutz Medical campus totaled \$454,228,513
- CU Denver | Anschutz is ranked 23 for NIH Federal Funding nationally
  - Skaggs School of Pharmaceutical Sciences is ranked #5 for NIH funding for Pharmacy Schools
  - CU School of Medicine is ranked # 8 for public schools and # 22 overall Public/Private Schools for Federal Research funding
- Research is a critical part of our mission.
  - Top Talent want to be in this environment = multifaceted mentors for students!
  - Top Students are attracted to and want to be educated in this environment!
  - Outstanding faculty secure millions \$\$ in training grants to support students/trainee stipends, insurance, tuition costs
  - Careers are established and discovery from bench to bedside happens with high frequency
- Many types of research are supported with a variety of CU funds

<https://www.cu.edu/sponsored-research>



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# Overview of Research AWARDS, FY 16

	Direct	Indirect	TOTAL
<b>Total CU Anschutz</b>	<b>\$355,009,688</b>	<b>\$99,467,917</b>	<b>\$454,228,513</b>
Associations and Foundations	\$39,504,133	\$5,235,675	\$44,739,810
Fed DOD	\$4,333,606	\$1,508,780	\$5,842,386
Fed NIH	\$146,130,742	\$53,836,329	\$199,745,763
Fed NSF	\$798,566	\$415,960	\$1,214,526
Fed Other DHHS	\$30,659,938	\$5,899,211	\$36,559,149
Fed Other Fed	\$1,607,537	\$319,499	\$1,927,036
Fed VA	\$7,404,769	\$48,922	\$7,453,691
Hospitals and Universities	\$26,131,936	\$10,521,933	\$36,626,082
Industry	\$60,175,741	\$15,132,365	\$75,308,107
International	\$4,933,413	\$766,253	\$5,699,665
State and Local Government	\$33,329,307	\$5,782,990	\$39,112,298



# Overview of Research Expenditures, FY 2015

HERD DATA	CU Anschutz
Federal	\$ 260,653,067
SUBTOTAL Federal	\$ 260,653,067
State/Local Government	\$ 16,822,957
Business	\$ 40,718,270
Nonprofit	\$ 38,828,016
Institutional Funds	\$ 30,420,781
All other Sources	\$ 3,692,055
SUBTOTAL OTHER	
SOURCES	\$ 130,482,079
TOTAL Expenditures HERD FY 15	\$ 391,135,146

CAMPUS Misc. Investments in Research	
GIFTS 34 Coded Research	\$ 24,158,312
SOM UPI AEF Research	\$ 36,224,491
SOM UPI DEF Research	\$ 3,696,316
SOM CHCO Research Institute	\$ 7,484,586
SOM UCH Gift Expenses (not included above)	\$ 1,075,634
Mandatory Cost Share (Misc.F/A,Aux,Gift)	\$ 2,316,254
Fund 26 Auxiliary (Clsd CT, Royalties)	\$ 3,878,322
	<b>\$ 78,833,915</b>
CAMPUS Investments in Research F&A	
VCR (OGC, compliance, EHS)	\$ 14,953,141
	<b>\$ 14,953,141</b>



# History CU Anschutz Medical Campus Research

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- 1883-1925 CU School of Medicine – Boulder, Colorado; 2 Rooms, 2 Faculty - relocated to ADenver 1925
- 1962 first identification of “battered child” syndrome – Drs. Henry Kempe and Henry Silver – creation of the national Kempe Center for Child Abuse and Neglect
- 1965 first Nurse Practitioner program – 1968 first Child Health Associate/Physician Assistant program
- 1990 Cancer Center receives NCI designation – research and clinical activities
- 2001 – 2008 Health Sciences Center relocates to Fitzsimons/Anschutz Medical Campus – Medicine, Nursing, Public Health, Dental Medicine, Pharmacy, Grad School
- 2006 Charles C. Gates Center for Regenerative Medicine – stem cell research
- 2008 Linda Crnic Center for Down Syndrome created – research & clinical
- 2010 Center for Woman’s Health Research created
- 2012 Alzheimer’s Research Center
- 2015 Health Data COMPASS - big data and the Colorado Center for Personalized Medicine Created – jointly with affiliate partners



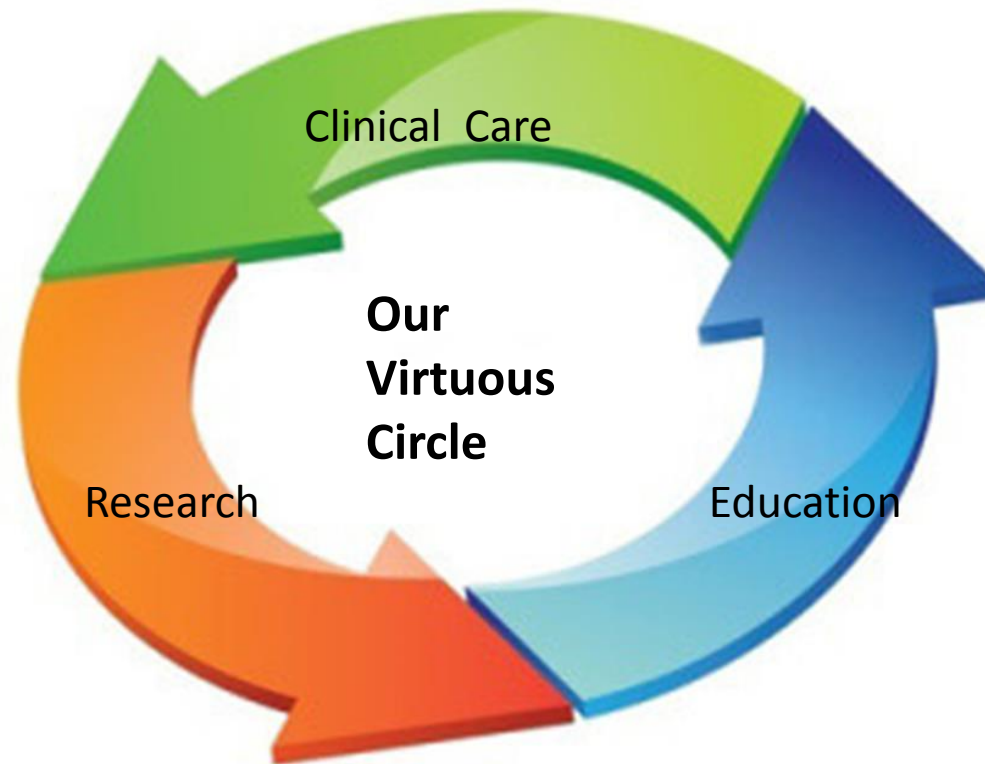


# Highlights CU Anschutz Medical Campus Research

- CU School of Medicine – 1st successful Liver Transplant in the world – Dr. Thomas Starzl
- Created vaccine for shingles
- First to develop a classification and numbering system for human chromosomes
- Discoveries prevented AIDS virus from reproducing and spreading to healthy cells
- CU Cancer Center has highest cancer survival rates in the state and one of only 45 “Comprehensive Centers” in the U.S. designated by NCI – extensive research and discovery activities!
- School of Dental Medicine SDM Center for Biomaterials & Bioengineering design & synthesis of polymeric materials for use throughout world in a variety of biomedical applications in dentistry and medicine, i.e. drug delivery, tissue scaffolds, caries prevention.
- College of Nursing led the nation in the past in recognition of, measurement of, and treatment of pediatric pain.
- Colorado School of Public Health – important discoveries into the causes and prevention of type 2 diabetes, behavioral intervention that reduces development of diabetes by over 50% in high risk people.
- CU Anschutz Medical Campus FY 15: a record 21 patents (1,936 patents since 2002), 98 invention disclosures, and 4 more startup companies (53 since 2002)



# CU Anschutz Medical Campus



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# Boulder Campus



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# Campus Overview

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- In FY 2016 research awards at the CU Boulder campus totaled \$437M
- Research is a critical part of our mission

## Notable Accomplishments

- Number 1 in the nation for atomic, molecular and optical physics program in the nation since 2006
  - 4 Nobel Laureates in Physics
- Number 1 public university recipient of NASA research funding
- 650 faculty and students involved in interdisciplinary bioscience research
- 51 CU- Boulder startups have headquarters or research operations in Colorado
- More than 2,000 undergraduates directly involved in research
- Ranked number 22 in the world for scholarly citations and research impact



<https://www.cu.edu/sponsored-research>

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# Highlights of CU Boulder's Research

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- Created 87 new companies since 1994 based on CU Boulder technologies, which have raised nearly \$2.9 billion in financing
- Submitted 548 inventions to the Technology Transfer Office in the previous 5 years

## EXAMPLES OF NOTABLE ACCOMPLISHMENTS

- Created an inhalable measles vaccine, eliminating the need for refrigeration, needles and syringes
- Developed techniques for the chemical synthesis of DNA and RNA
- Produces the longest running forecast of the Colorado economy, now in its 51<sup>st</sup> year, which analyzes changes in industry sectors and predicts employment trends
- Built and launched an instrument to every planet in the solar system in collaboration with industry partners including Ball Aerospace, Lockheed Martin, Northrup-Grumman, United Launch Alliance
- Created a degradable gel-like scaffolding that can stimulate the growth of new human tissues to replace those lost by injuries and disease

<https://www.cu.edu/sponsored-research>



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# Overview of Research AWARDS, FY 16

	Total Expenditures
TOTAL CU BOULDER	\$436,836,349
ASSOCIATIONS, FOUNDATIONS & PRIVATE NON PROFITS	\$18,370,290
Fed NASA	\$79,593,383
Fed NSF	\$76,354,818
Fed DHHS	\$65,378,634
Fed DOC	\$45,584,521
Fed DOD	\$31,096,226
Fed DOE	\$17,343,327
Fed ED	\$5,519,226
Fed Other Fed	\$10,997,608
Hospitals and Universities	\$34,736,320
Industry	\$15,027,744
International	\$32,607,705
State and Local Government	\$4,226,547





# How does CU Boulder compare?

## NSF Rank, Institutional Expenditure vs. Total Expenditure

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Campus	Total Research Funds	Portion of Research Funds from Institution		Total Research Spending Rank	Institution Research Spending Rank
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Top 100 Institutions	\$52,946,375,000	\$11,990,357,000	22.60%	n/a	n/a
Denver Anschutz	\$411,020,000	\$28,334,000	6.90%	54	143
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Required matching, equipment, infrastructure, publication costs, seed grants, travel,



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# Total Cost of Research Expenditures, FY 2015

HERD Data	CU Boulder
Federal	\$353,340,611
State/Local Government	\$1,982,882
Business	\$10,960,525
Non-profit	\$22,224,440
Institutional Research Activity	\$32,264,831
<b>Total Expenses</b>	<b>\$420,773,289</b>

Summary of research expenditures	
Institutional Research Activity	\$32,264,831
Administrative Costs	\$18,158,086
Facility Costs	\$42,700,077
<b>Total</b>	<b>\$93,122,994</b>



# Research Benefits

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## Benefits of Research:

- **Undergraduate and Graduate Education**
  - The teaching and research missions at CU Boulder are interdependent
  - 2000+ undergraduates directly involved in research & creative works
- **Economy**
  - 87 new companies formed, 67 still in operation
  - Over the last 5 yr, 548 inventions, 140 license and option agreements
- **Reputation**
  - #22 worldwide for research and scholarly impact
  - #1 public university recipient of NASA research
  - Student and Faculty Recruitment
- **Community Access & Impact**
  - Music, Shakespeare, Law, Business
  - Outreach and engagement



# Colorado Springs Campus



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# Campus Overview

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- In FY 2016 research awards at the UCCS campus totaled \$7,969,868
- Many types of research are supported with a variety of types of CU funds
- UCCS is the only public institution of higher education in Southern Colorado with a mission that includes research, as approved by the Colorado General Assembly in 2011:

*The Colorado Springs campus of the University of Colorado shall be a comprehensive baccalaureate and specialized graduate research university with selective admission standards. The Colorado Springs campus shall offer liberal arts and sciences, business, engineering, health sciences, and teacher preparation undergraduate degree programs, and a selected number of master's and doctoral degree programs.*



<https://www.cu.edu/sponsored-research>

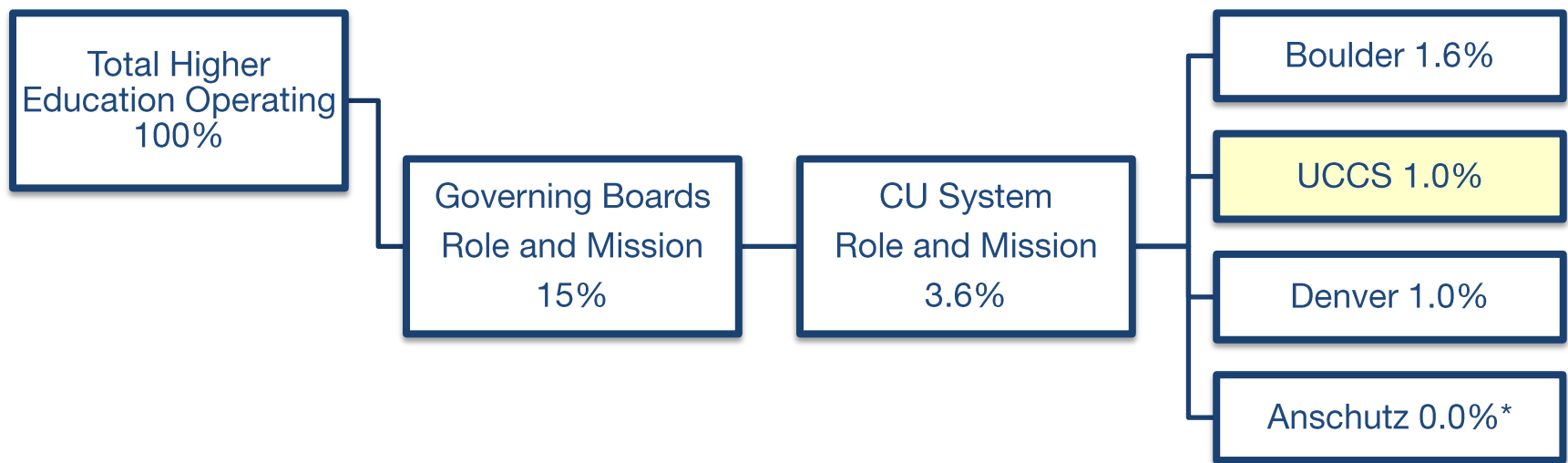
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# Research Component of State Funding Model

- There are no dollars specifically designated for research in the state funding formula for higher education.
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# How does UCCS compare?

## NSF Rank for All Sponsors, Institutional Expenditure vs. Total Expenditure

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Top 100 Institutions	\$52,946,375,000	\$11,990,357,000	22.60%	n/a	n/a
Denver Anschutz	\$411,020,000	\$28,334,000	6.90%	54	143
Boulder	\$379,475,000	\$31,985,000	8.40%	58	129
UCCS	\$5,363,000	\$450,000	8.40%	384	476
Median UCCS Peer Institutions	\$12,302,000	\$3,169,000	25.76%	302	284

[https://ncesdata.nsf.gov/herd/2014/html/HERD2014\\_DST\\_18.html](https://ncesdata.nsf.gov/herd/2014/html/HERD2014_DST_18.html)



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# Overview of Research Awards, FY 2015

	Direct	Indirect	Total Expenditures
TOTAL UCCS	\$7,089,564	\$1,165,004	\$8,254,568
Associations & Foundations	\$499,676	\$31,329	\$531,005
Fed NSF	\$1,341,787	\$284,858	\$1,626,645
Fed NASA	\$11,968	\$2,753	\$14,721
Fed DOC	\$112,707	\$25,923	\$138,630
Fed DOE	\$108,211	\$17,117	\$125,328
Fed ED	\$380,020	\$46,585	\$426,605
Fed Other Fed	\$2,739,147	\$454,139	\$3,193,286
Hospitals and Universities	\$373,228	\$35,268	\$408,496
Industry	\$1,145,537	\$230,066	\$1,375,603
International	\$31,072	\$10,388	\$41,460
State & Local Gov't.	\$346,210	\$26,577	\$372,787



# Overview of Research Expenditures, FY 2015

HERD Data	UCCS	Institutionally Financed Research	
Federal	\$5,525,215	All research funded	\$1,342,142
State/Local Government	\$497,312	Cost Sharing	\$92,141
Business	\$805,591	Subtotal Institutional Funds	\$1,434,283
Non-profit	\$1,426,450	Other	
Institutional Funds	\$1,434,283	Research Office & Accounting Office	\$776,662
Total Expenses	\$9,688,851	Total Campus Investment in Research	\$2,210,945



# UCCS Scholarship Activities

Scholarship Activity	Number in 2015
Artistic Works and Publications	259
Books and Book Chapters	97
Journal Articles	250
Textbooks	5
Patents	12
Presentations	127
New sponsored programs awards	40
Sponsored program proposals	138
Faculty submitting proposals	110

All data except grant activity taken from faculty reports of annual activities (Digital Measures). Grant activity is from yearly report from Sponsored Programs. There were 265 TTF and 27 research faculty in Fall 2015 (IR page)



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# UCCS Student Engagement

Scholarship Activity	Number in 2015
Enrolled in thesis, dissertation, independent study, research practicum, clinical research.	1403
Undergraduates funded by campus and college research programs (not grant funded)	40
Presented at Mountain Lion Research Day and CSURF	226
Published, Performed, or Presented with Faculty	536
Report participating in research (NSSE data)	6%



# Research Benefits

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## Benefits of Research:

- Development of knowledge / technology
- Improvement of lives through applications of basic science to address societal needs
- Enhances undergraduate and graduate education
- Program Accreditation requires integration of scholarship and teaching; professional accreditation enhances reputation
- Student and faculty recruitment and retention
- Technology transfer (intellectual property, patents)
- Research centers and institutes
- Collaborations with industry and community organizations





# Denver Campus



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# Campus Overview

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- In FY 2016 research awards at the CU Denver campus totaled \$24,975,175
- Research and creative works are a critical part of our mission
- Many types of research and creative work are carried out at CU Denver
- The arts, humanities, social sciences, scientific and technological research and creative work are all pursued at CU Denver—some examples of successes are:
  - Sustainable building products (College of Architecture and Planning)
  - Environmental policy research—water, etc. (School of Public Affairs)
  - Bridge/transportation research (College of Engineering and Applied Science)
  - Development of models for intervention in autism and developmental delays in young children (School of Education and Human Development)

<https://www.cu.edu/sponsored-research>



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# Overview of Research AWARDS, FY 16

	Direct	Indirect	TOTAL
<b>Total CU Denver</b>	<b>\$19,944,906</b>	<b>\$5,030,271</b>	<b>\$24,975,175</b>
Associations and Foundations	\$1,512,386	\$265,504	\$1,777,890
Fed DOD	\$482,004	\$159,896	\$641,900
Fed DOEd	\$3,041,936	\$183,135	\$3,225,071
Fed NIH	\$1,519,296	\$515,036	\$2,034,332
Fed NSF	\$4,427,968	\$1,671,129	\$6,099,097
Fed Other Fed	\$3,222,247	\$551,866	\$3,774,113
Fed VA	\$6,554	\$0	\$6,554
Hospitals and Universities	\$1,773,048	\$629,466	\$2,402,514
Industry	\$789,576	\$284,122	\$1,073,697
International	\$13,504	\$2,296	\$15,800
State and Local Government	\$3,156,387	\$767,821	\$3,924,207



# Overview of Research Expenditures, FY 2015

HERD DATA	CU Denver
Federal	\$ 13,691,644
SUBTOTAL Federal	\$ 13,691,644
State/Local Government	\$ 2,177,964
Business	\$ 237,259
Nonprofit	\$ 1,624,448
Institutional Funds	\$ 807,118
All other Sources	\$ 407,378
SUBTOTAL OTHER	
SOURCES	\$ 5,254,168
TOTAL Expenditures HERD FY 15	\$ 18,945,812

CAMPUS Investments in Research	
GIFTS 34 Coded Research	\$ 126,543
Fund 26 Auxiliary (Royalties)	\$ 118,359
	\$ 244,902
CAMPUS Investments in Research F&A	
Central Support for Pilot Projects/Matching	\$ 193,500
Cost Share (fund 10,11)	\$ 32,379
VCR (OGC, compliance, EHS)	\$ 1,636,676
	\$ 1,862,555



# Research Benefits

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- A few examples of the benefits of research and creative work at CU Denver:
  - Enhances educational experiences for undergraduate and graduate students(also contributes to retention)
  - Increases economic impact of the campus
  - Allows for more competitive recruitment of students and faculty
  - Provides community access to latest knowledge/reciprocally beneficial relationships between community and university
  - Development of new knowledge/technology for benefit of society
  - Attracts philanthropic contributions
  - Enhances our culture and way of life

