



# Taking Computing+Data Wide Across the Curriculum: The Illinois CS+X Degrees

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ILLINOIS

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

# Caveat: Got a New Day Job, *Not* at UIUC...



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April 10, 2017

### Pitt Names Senior Vice Chancellor for Research

**Rob A. Rutenbar, a senior administrator at the University of Illinois, brings nearly 40 years of innovation and technology experience to Pitt**

Contact: Anthony Moore [amm114@pitt.edu](mailto:amm114@pitt.edu) 412-624-8252 Cell: 412-715-3644

[High resolution image\(s\) available >](#)

[An interview with Rutenbar can be read here.](#)

**PITTSBURGH**—Rob A. Rutenbar has been named the University of Pittsburgh's senior vice chancellor for research. In this newly established position, he will lead the University's strategic vision for research and innovation, enhancing existing technological partnerships.

"I am delighted to welcome Rob to the University of Pittsburgh as our inaugural senior vice chancellor for research," said Chancellor Patrick Gallagher. "His experience as a researcher, innovator, collaborator and entrepreneur — both inside and outside of the university — make Rob uniquely qualified to support our faculty's research and innovation efforts and to champion Pitt research on a local, national and global scale."

Pitt Provost and Senior Vice Chancellor Patricia E. Beeson said Rutenbar is exceptionally well-suited for the role.



Rob A. Rutenbar

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#### Schools of the Health Sciences Media Relations

For more information about Pitt's schools of dental medicine, health and rehabilitation sciences, medicine, nursing, pharmacy, and public health, [click here >](#)

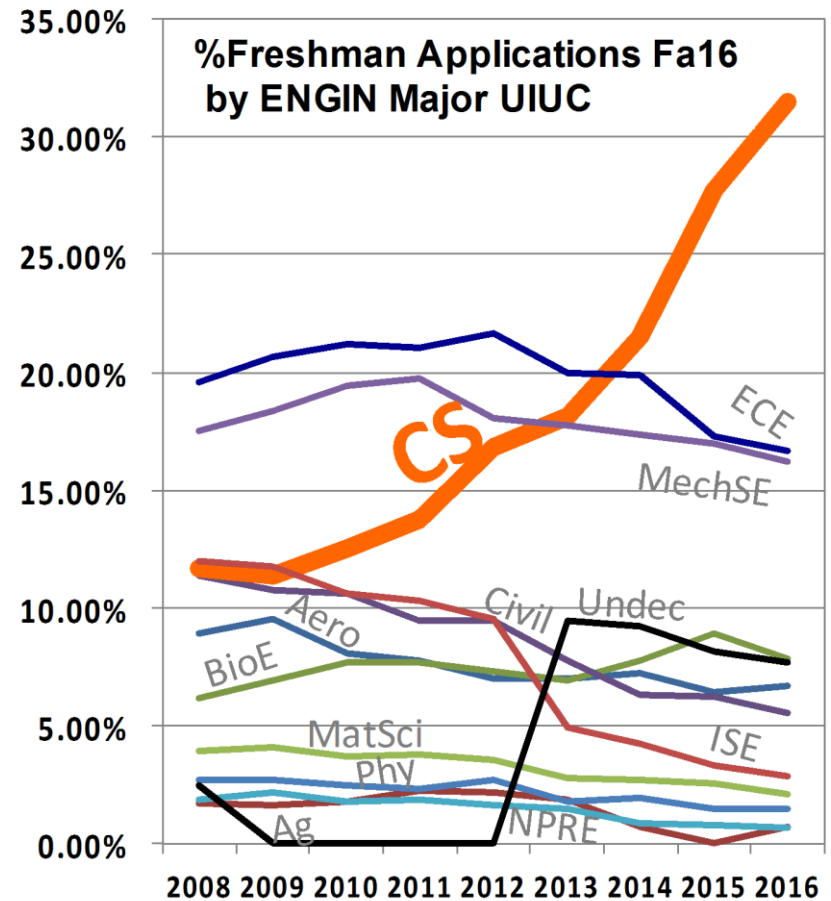
#### Urgent Question?

University of Pittsburgh news reps are available to answer urgent

# Yes, They Are Coming In Front Door...



## ■ At Illinois, this is the CS major in Engineering



# Response the First: Go Deep



**Add ...**

**More Teaching Staff**

**More TAs**

**More UG graders/asst**

**More Classes**

**More Seats/Sections**

**More Faculty...**

# Response the First: Go Deep



**Necessary**

**But...**

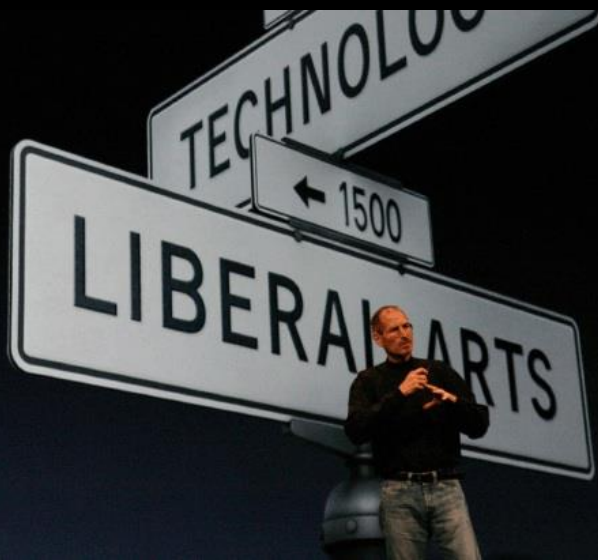
***Not* sufficient**

# Response the Second: Go **WIDE**

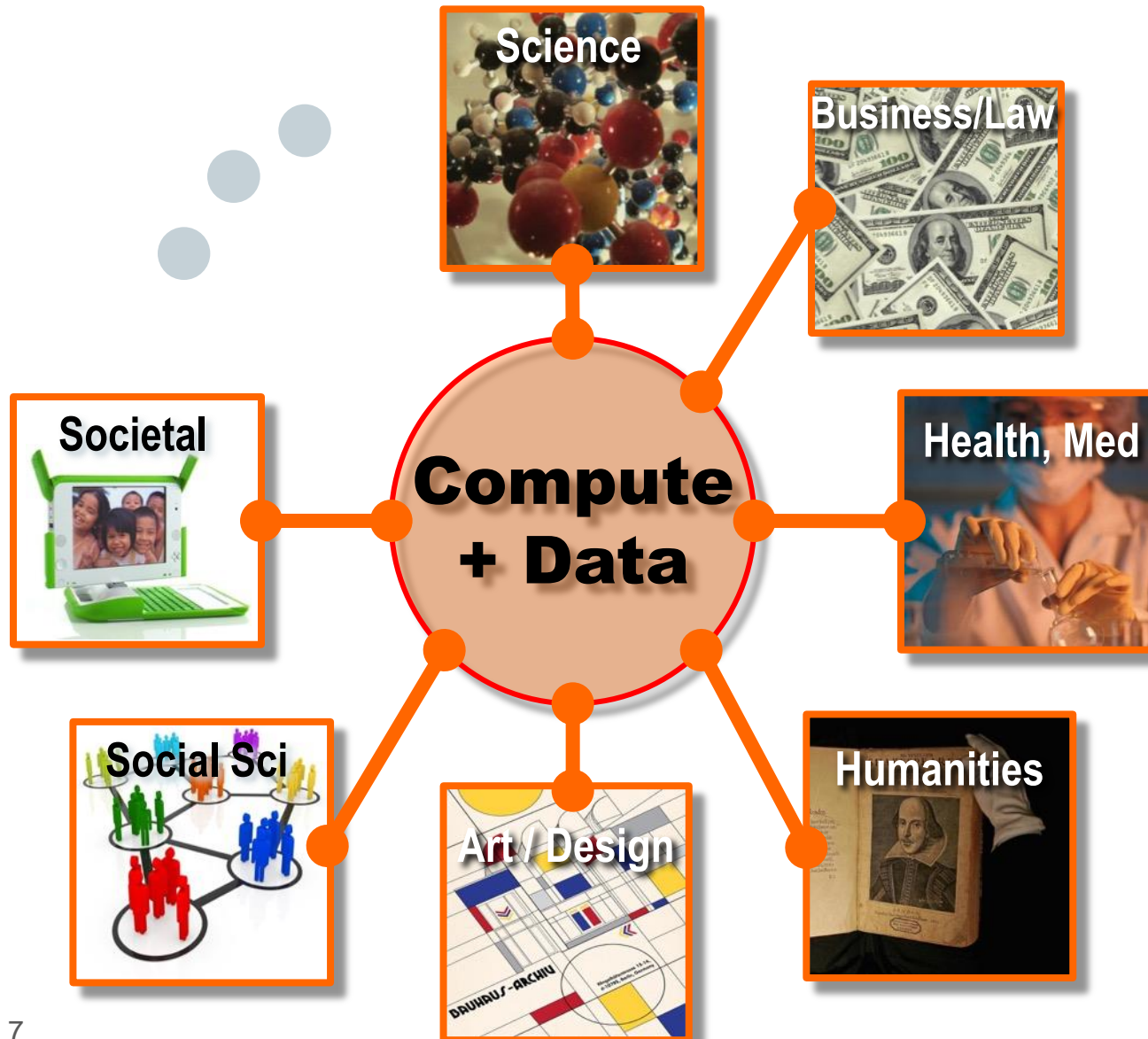


**“It’s technology married with liberal arts, married with the humanities, that yields the results that make our heart sing.”**

Steve Jobs



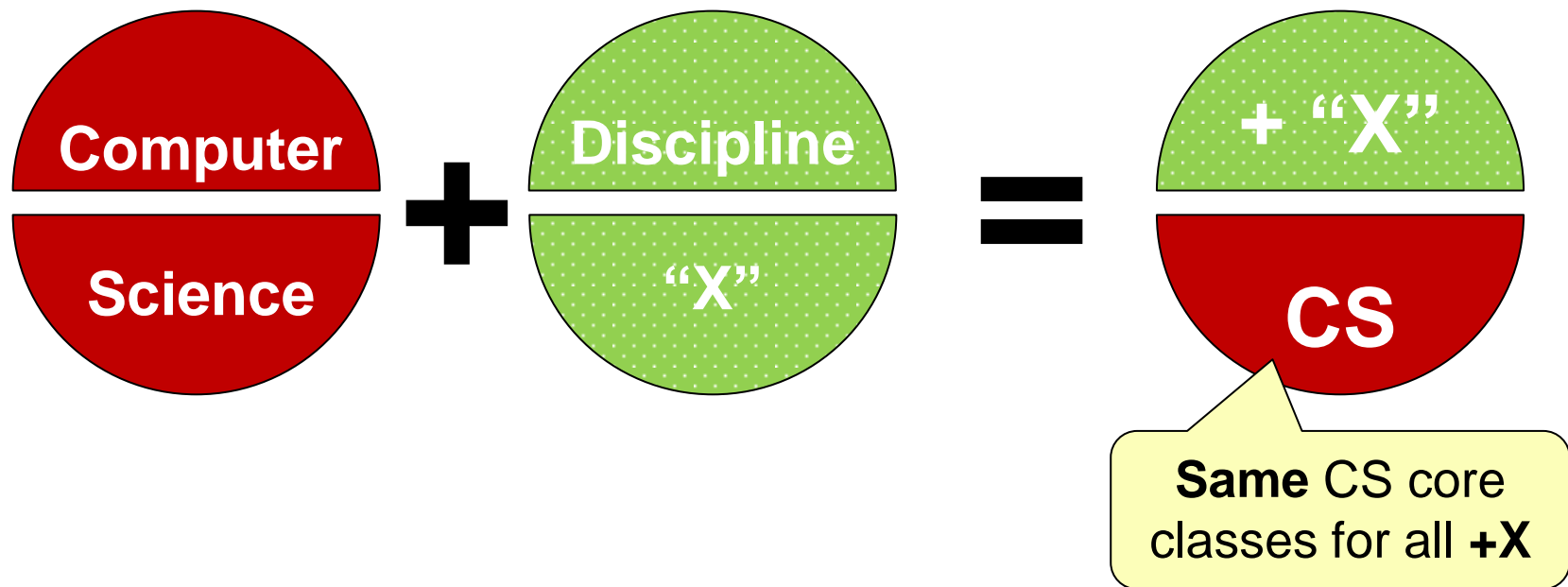
# Wider Response: Become a Hub For..



# Our Response: Illinois CS+X Degrees



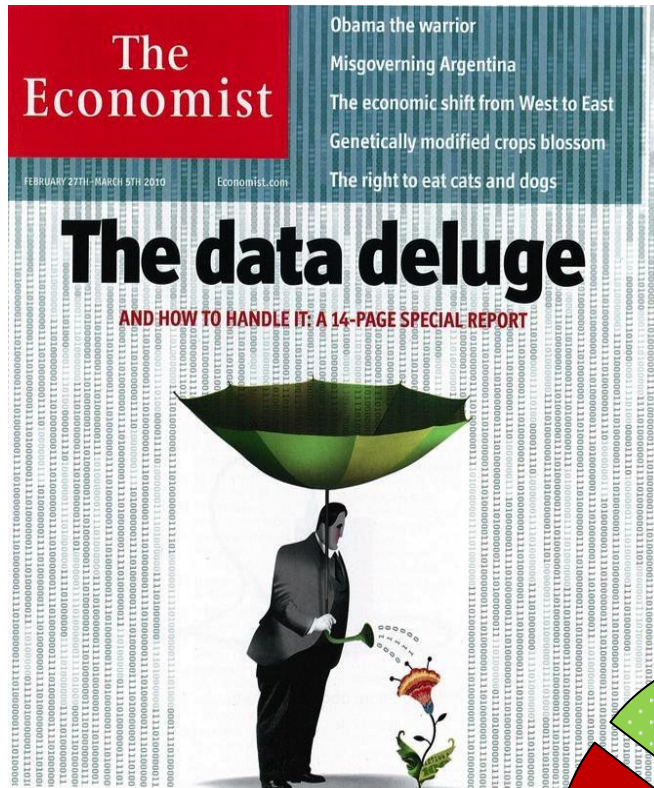
- They are *not*: Minor in CS/X. Dual degree.
- They are: **CS(1/2) + X(1/2)= Bachelors in Dept of +X**



# Illinois CS+X: Why Go WIDE?



## Positive pressure



## Negative pressure

### The Morbid Fascination With the Death of the Humanities

Why professors, librarians, and politicians are shunning liberal arts in the name of STEM

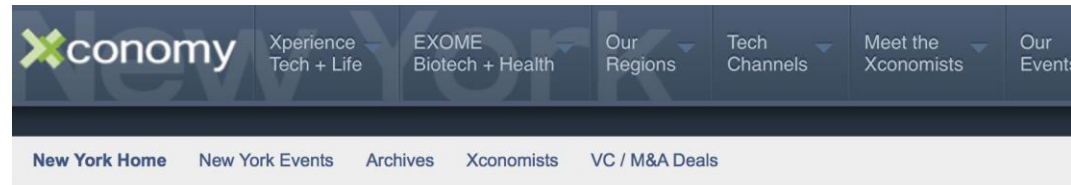


<http://www.theatlantic.com/education/archive/2014/06/the-morbid-fascination-with-the-death-of-the-humanities/372216/>

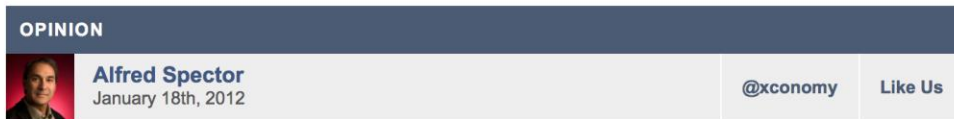
# Credit for Coinage: Alfred Spector



- Alfred Spector, former VP Research Google, coined name “CS+X” around 2004
- Name widely circulated in Xconomy blog post Jan 12



## CS + X, for all X



### Xconomist Report

What should students be studying now to prepare for 10 years from now?

The impact of information-based technologies

will continue to grow—probably at an accelerating rate. In nearly every segment of society, we see both quality and productivity improvements because of increased use of automation and digital communication. The impact is obviously huge in some sectors such as finance and publishing. And it will only grow in the laggards, such as education and healthcare, despite the immense challenges due to inertia, privacy, and access.



SHARE



In Feb 12, I bought all the csplusx.\*\*\* domain names...

WHOis.net<sup>SM</sup>

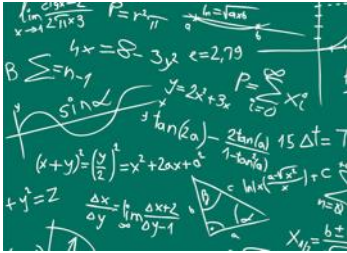
WHOIS LOOKUP



csplusx.org is already registered\*



## CS+Math



## CS+Statistics



Legacy degrees, decades old

## CS+Anthropology

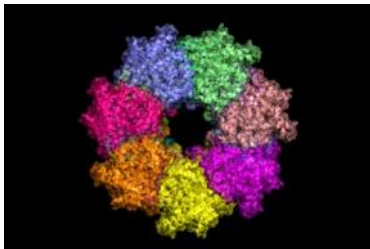


## CS+Astronomy

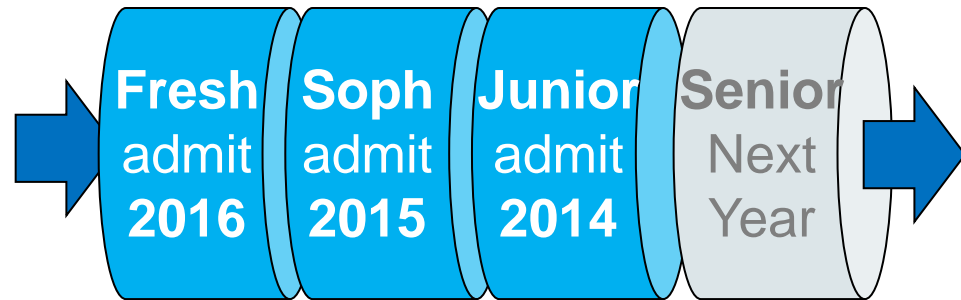


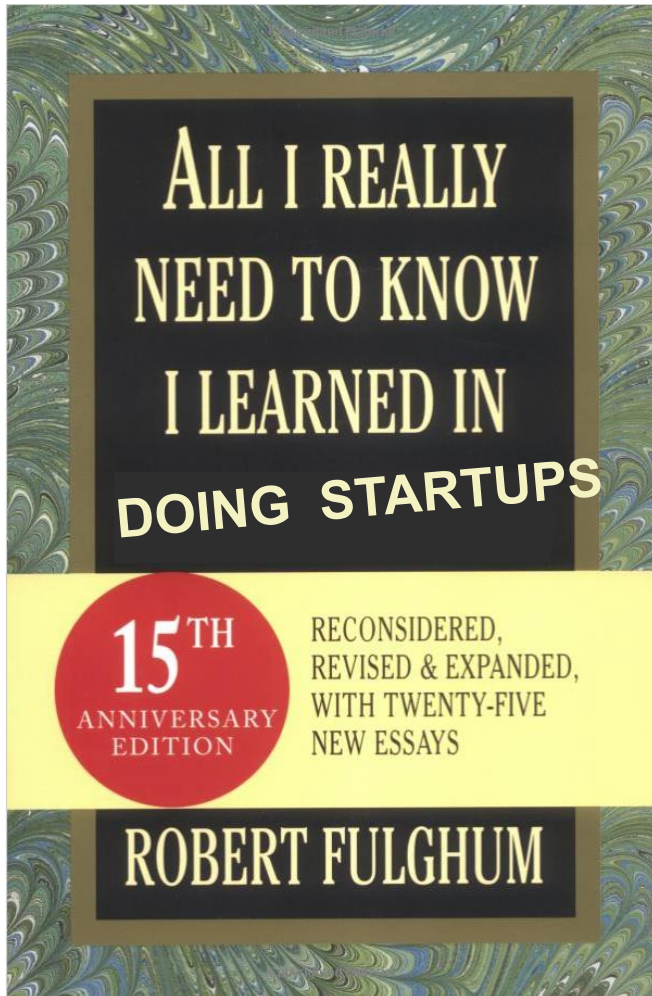
Design started in 2010,  
approved 2013, admits 2014

## CS+Chemistry



## CS+Linguistics





- **TTM matters**
  - Optimize design to get approvals **fast**
- **Minimum viable degree**
  - **Same** set of CS courses for all X's
- **First pitch: Just like Sand Hill Road**
  - **15mins:** value prop, team, \$\$, upside
- **Need "early adopter" customers**
  - Find **partner X's** and **faculty inside X** who really, really want **CS+X**
- **Need a business model early**
  - **CS+X** is like ENG: tuition differential is paid. **We split it** (ENG & College[X]).



- **To first order, same CS courses in**
  - Intro Programming
  - Software Programming Studio
  - Discrete Math
  - Prob/Stat for CS
  - Data Structures
  - Systems Programming
  - Digital Design & Architecture
  - Programming Languages
  - Algorithms
  - ...getting **CS faculty buy-in** on this “spanning basis” is **critical**
- **Basic philosophy: Get solid foundation of CS “stuff” across theory, software, hardware, etc → go do “X”**

# Illinois CS+X Notable Side Effects...



Q: Are you *really* making anthropologists take Comp Arch?

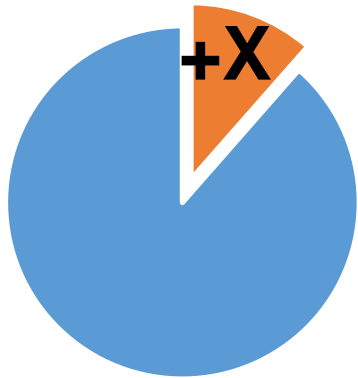
A: **YES**

Unexpected response: Leadership in Liberal Arts very positive that the CS part of CS+X **not watered down** to accommodate their students. Selling point for them.

# Illinois CS+X: Traction

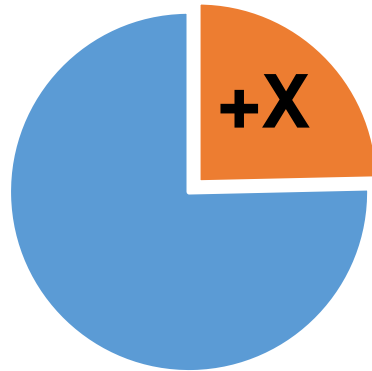


## Anthropology



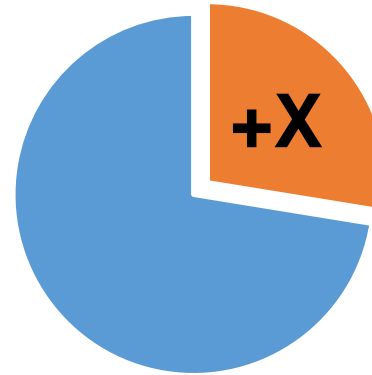
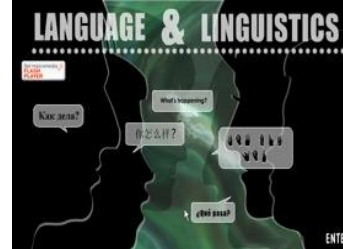
**~11%**  
Of students

## Astronomy



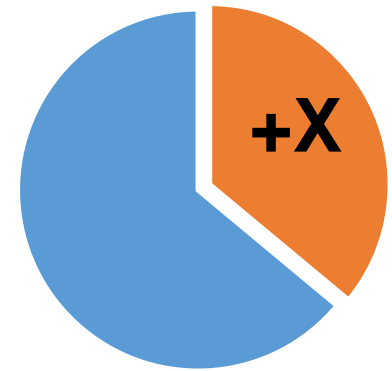
**~25%**  
Of students

## Linguistics



**~28%**  
Of students

## Statistics

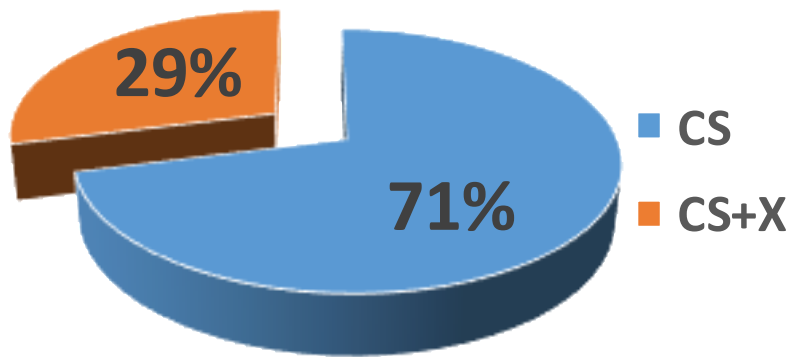


**~36%**  
Of students

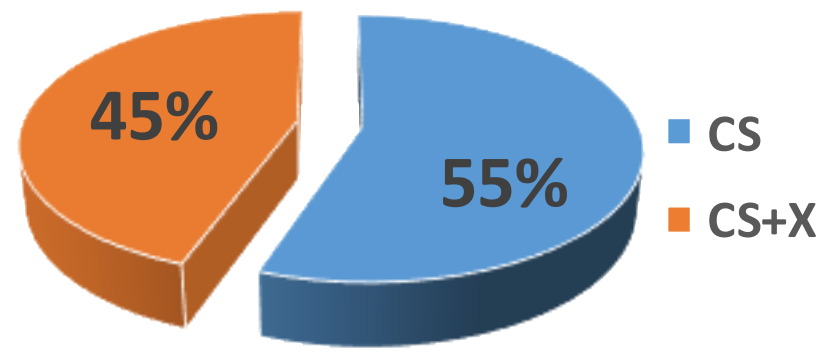
# Illinois CS+X: Last Year's Numbers



- CS+X approaching **30% of all CS**
- CS+X approaching **50% of admitted Freshman '16 class**
- CS+X new degrees now **28% female**



**Total CS Enrollment**



**Freshman 2016 Enrollment**



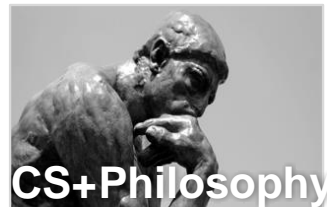
... creates more demand



# Illinois CS+X: Rising Popularity



- Huge interest to be “next X” – but clear some X’s better served by **“more data, less compute”** → **DS+X**

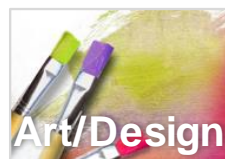
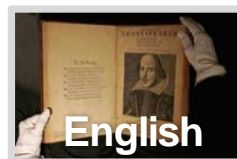


Next 5 X’s --  
approved by CS  
& “X” Units

11  
More  
X’s

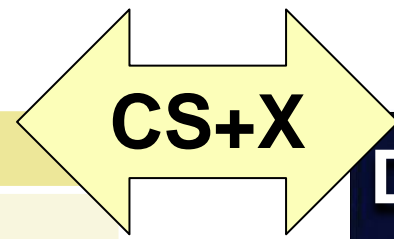


In discussion

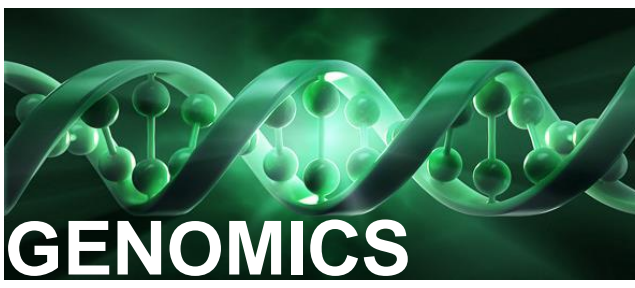
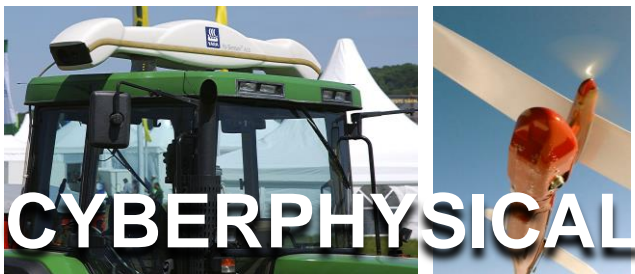
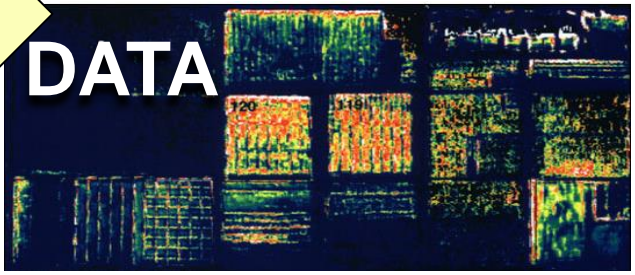




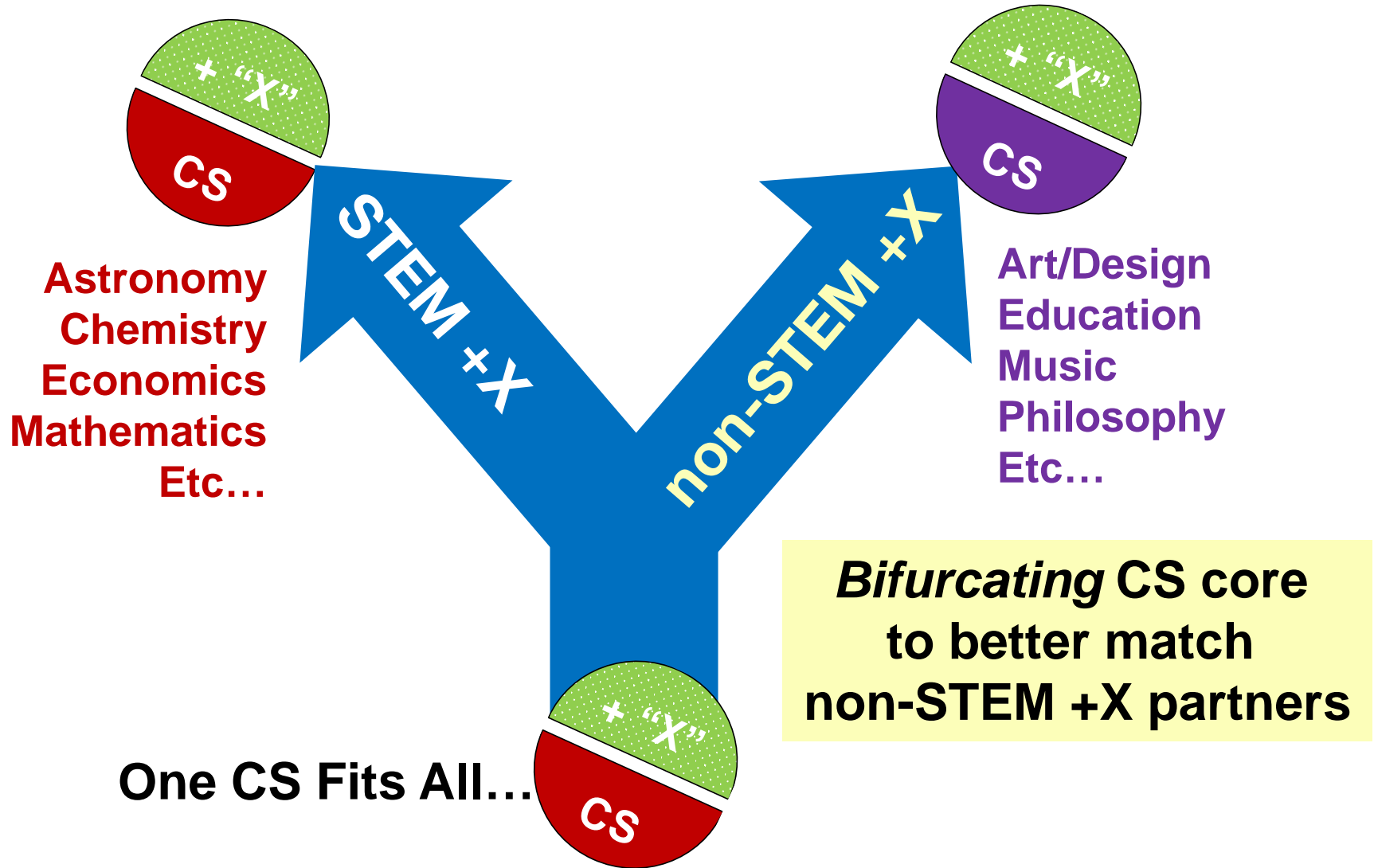
# One New Illinois CS+X: X=Crop Science



Crop Sciences Core	
CPSC 112	Introduction to Crop Sciences
Select two of the following:	
CPSC 226	Introduction to Weed Science
CPSC 270	Applied Entomology
PLPA 204	Introductory Plant Pathology
CPSC XXX	New Course- Data in Bio & Agric
CPSC 261	Biotechnology in Agriculture
CPSC 265	Genetic Engineering Lab
CPSC 352	Plant Genetics
CPSC 440	Applied Stats Methods I
Select two of the following:	
CPSC 418	Crop Growth and Management
CPSC 452	Advanced Plant Genetics
CPSC 453	Principles of Plant Breeding
CPSC 466	Genomics for Plant Improvement
CPSC 498	Crop Sci Professional Developmnt



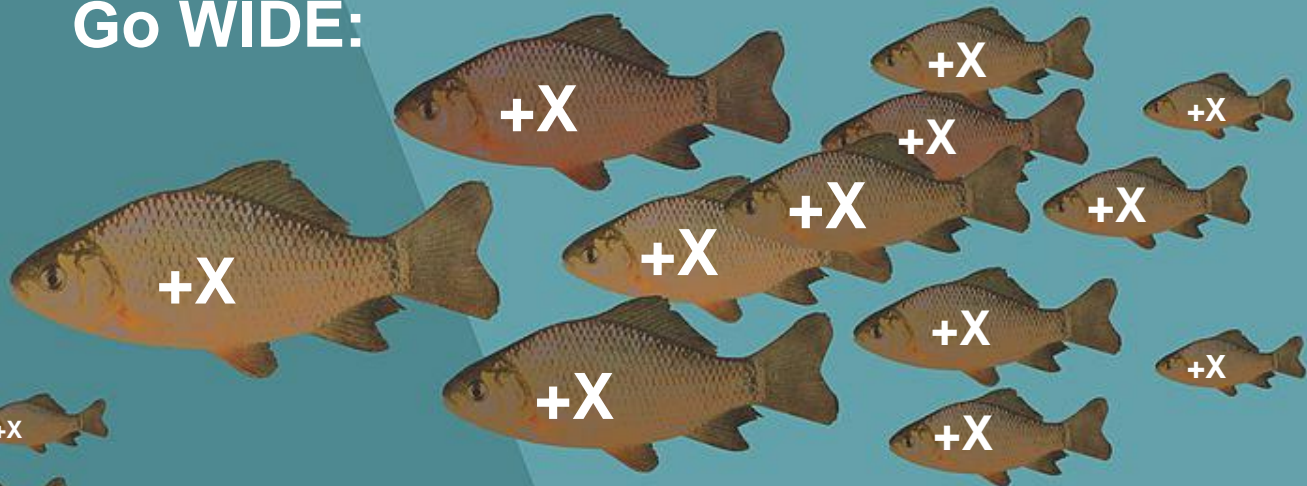
# Illinois CS+X: What We Do Now...



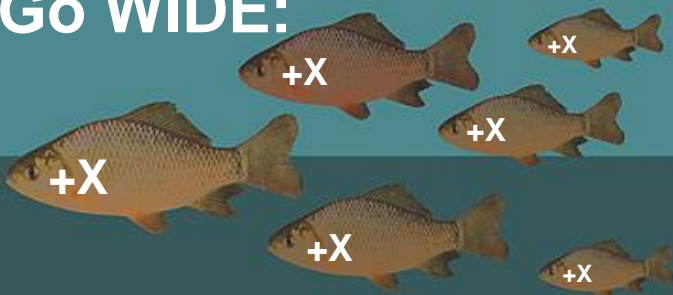
# CS+X Summary: **Wide** (not Deep)



Go WIDE:



Go WIDE:



Go DEEP: For CS Majors

