

# Academia Schmacademia Part III: Having a Tech Job in Austin

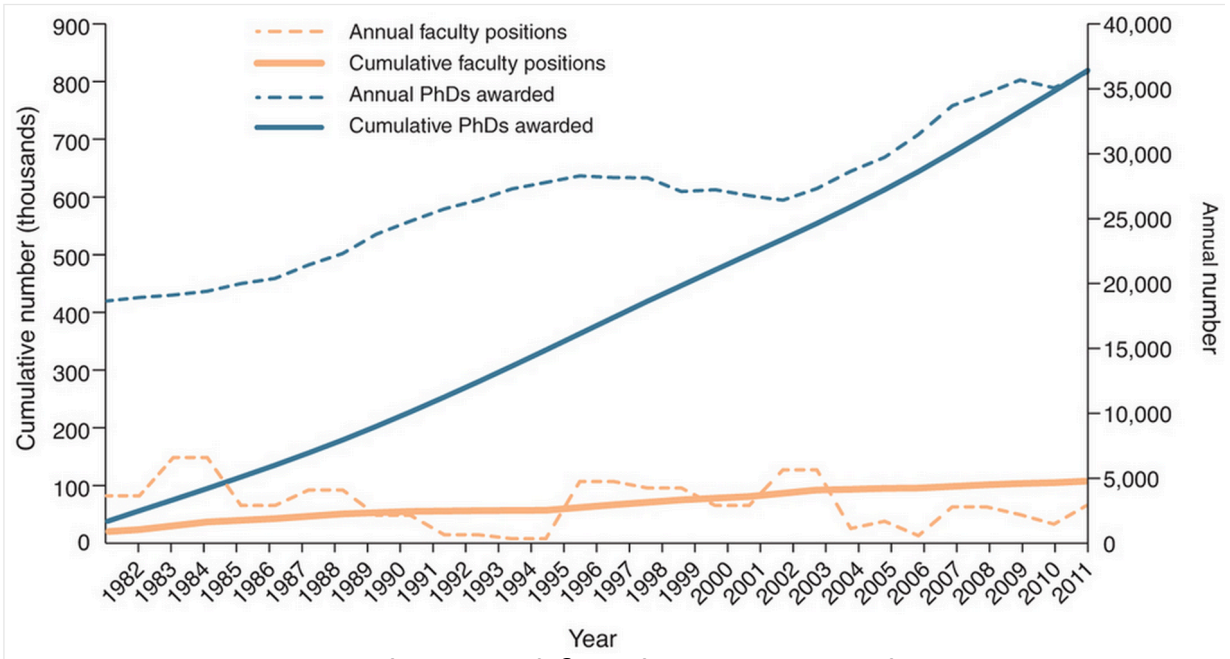
Chris Lindner

## **Section I**

**Why do I care about what you're  
saying?**

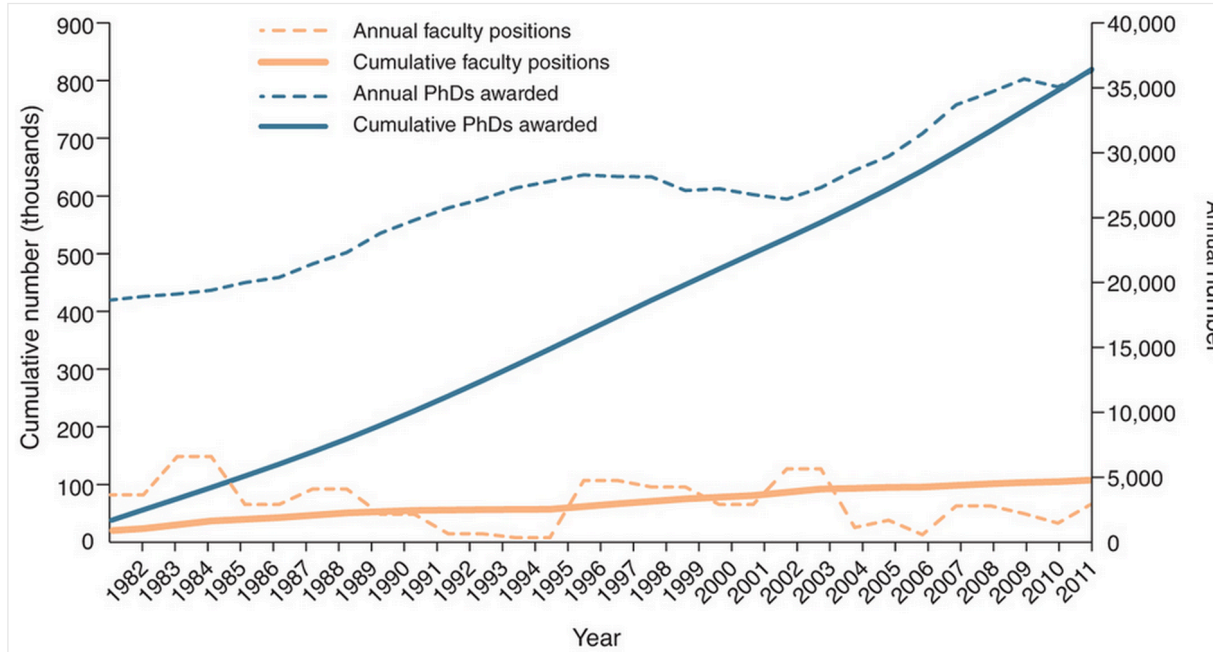
**You're probably not going to be a  
professional astronomer.**

# Seriously.



Science PhDs and faculty positions by year  
Schillebeeckx, Maricque, & Lewis, 2013, *Nature*

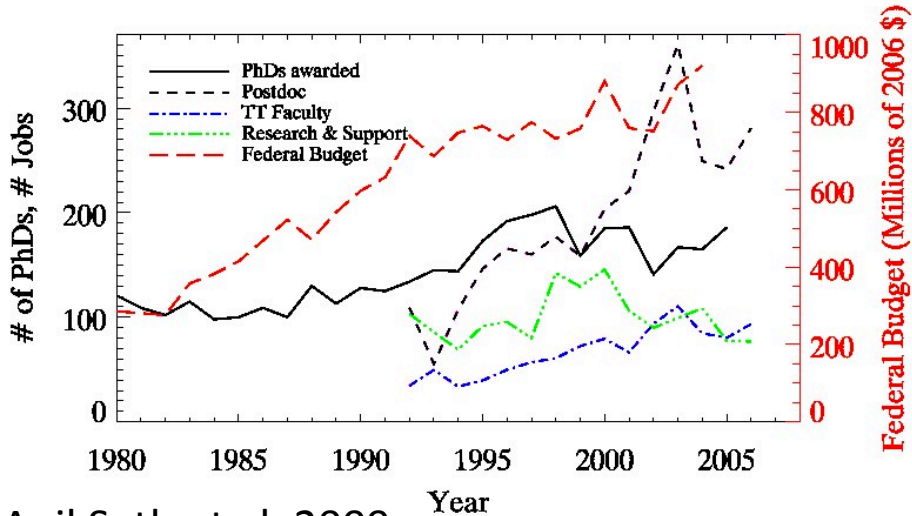
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***Okay... it's probably not quite that bad.***

# ... but it's still pretty bad.



Anil Seth et al. 2009

Between 28% and 57% of people getting an astronomy Ph.D. will have a long term career in the field in a steady state job market.

[~40-60% of which will be soft money and other non-faculty]

- Lisa Wells

Assum[ing] that the number of permanent academic positions in [astronomy] remains constant over time, each academic will produce just one PhD who will get a permanent job.

Under the present supply of PhD studentships an academic can expect to get a PhD student at least once every three years or so. At a minimum, therefore, over a 30 year career one can expect to have ten PhD students.

Peter Coles 2009

# Don't believe everything you're told...

From <https://aas.org/learn/careers-astronomy>



**In recent years, there have been about 150 job openings for astronomers in North America, while the number of Ph.D.s conferred annually in recent years has averaged about 125. It is common for astronomers to spend from three to six years in postdoctoral positions before finding a steady position in a university department, national facility, or government lab.**

**In such a small and popular field, only those with a quality education, ability, and passion for the subject are likely to find a permanent position.**

Astronomy training, however, emphasizes a remarkably broad set of problem-solving skills. With careful selection of graduate school courses and experiences, one may prepare for an interesting and productive career in a related field, such as industrial research, education, and public information.

# To summarize...

**150  
PhDs / yr.**



**50 Faculty Jobs / yr.**  
(Some of which dissolve, go to existing profs, go to international PhDs, etc.)



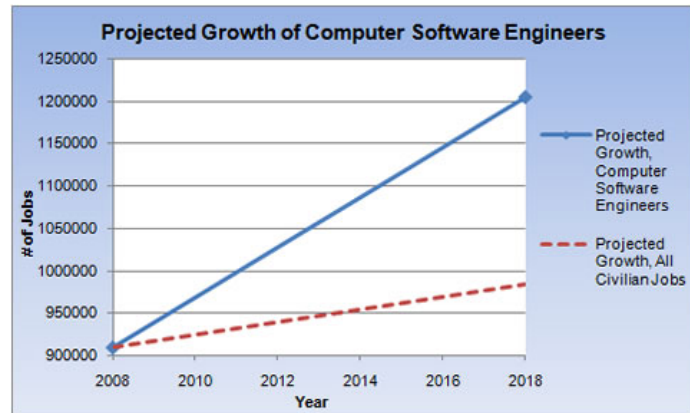
# But there's good news!

- Some of you will get tenure track faculty jobs (*probably*)
- There are a good number of lab, telescope, soft money, etc. jobs out there.
- **If you position yourself properly, there are a number of engaging, fulfilling, and well-paying jobs out there for you.**

# **Section II: Why Data Science?**

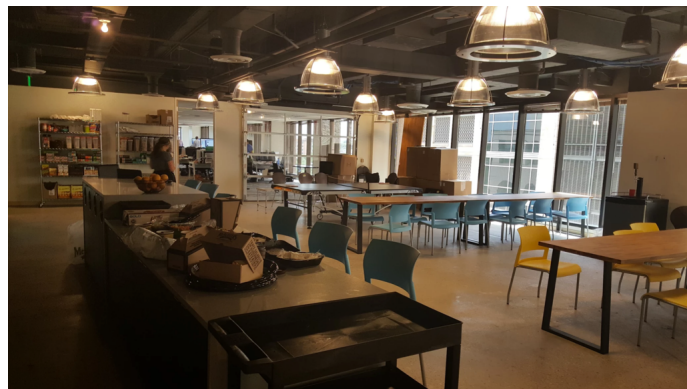
# Why tech?

- Tech is *booming* right now
- There's not enough talent to go around
- This means big benefits for employees



# Some perks at Civitas

- Flexible hours + reasonable work week
- Unlimited vacation
- Focus on work/life balance
- Casual dress, casual atmosphere
- Work how you want
- Lots of employee events
  - Catered lunch on Wednesdays and breakfast on Fridays
  - Monthly happy hours
  - Quarterly “all-hands” parties
  - Lots of “teambuilding” events (tubing trips, startup games, battle of the bands, etc.)
- Ping pong, video games, etc. etc.
- 24/7 Unlimited snacks and drinks



# Why Data Science?

- DS is the research position of the tech industry
  - Use statistics, coding, and scientific reasoning to come up with new ideas and solutions to existing problems
- DS utilizes the skillset you already have
  - Math and problem solving
  - Project management
  - Coding / hacking
  - Communication
- There is no other formal route to DS; they're hiring us.
- There is a shortage of qualified data scientists

For more information on the skills you need, how to prepare and the interviewing process, check out my last two talks on DS.

- [http://www.as.utexas.edu/~jsilverman/gsps/lindner\\_jobs.pdf](http://www.as.utexas.edu/~jsilverman/gsps/lindner_jobs.pdf)
- [http://www.as.utexas.edu/~jsilverman/gsps/lindner\\_jobs\\_2.pdf](http://www.as.utexas.edu/~jsilverman/gsps/lindner_jobs_2.pdf)

**Section III:**  
**What does a Data Scientist do?**

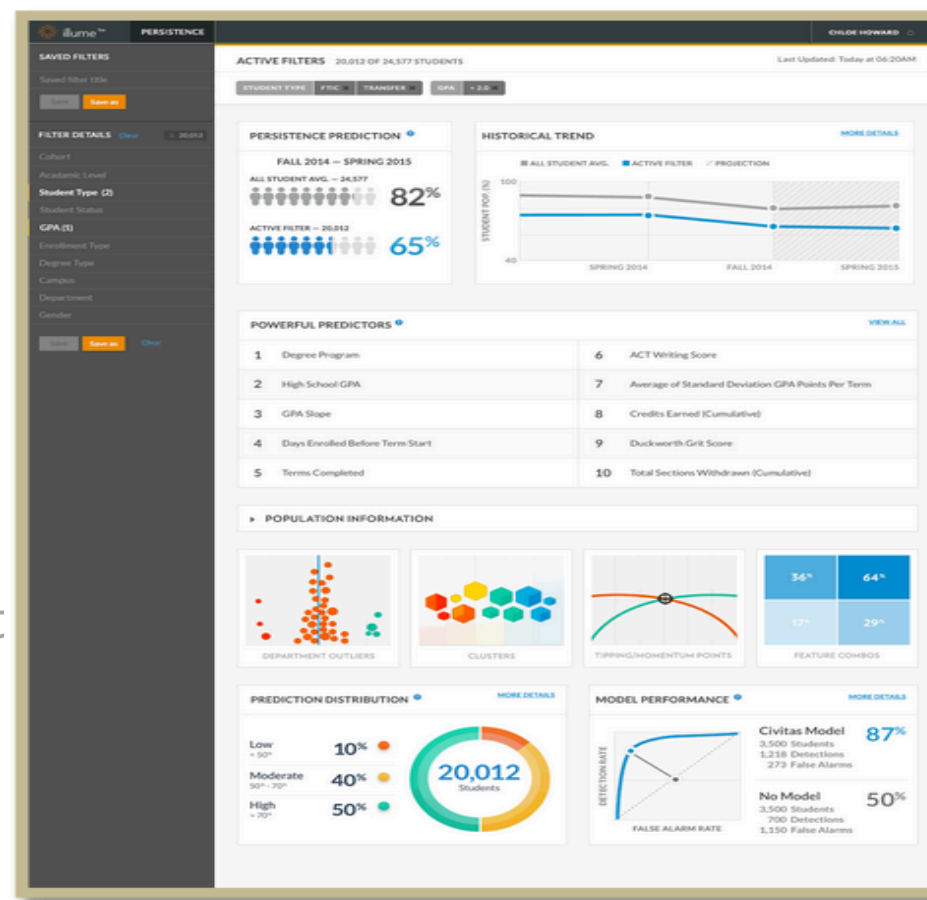


- “Pre-profit” education technology company
- 150 employees
- Sell software products and a data platform to universities
  - Have contracts with over 75 colleges and universities.
- One goal: ***graduate more students***



# What We Do

- Provide products to universities for administrators, advisors, professors, and students
- Products:
  - **Illume** – Modeling of groups of students to see what factors contribute to success
  - **Inspire** – Identifying students that are in trouble and notifying advisors and professors
  - **Degree Map** – Student degree planning and course recommendations



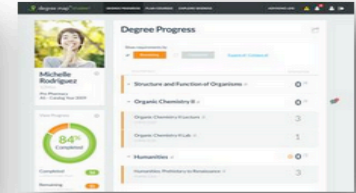
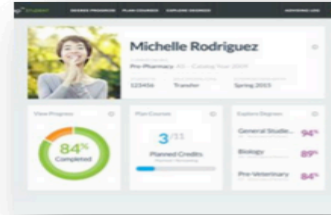
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**DEGREE MAP**  
*for*  
ADVISORS, STUDENTS & FACULTY

# Data Science at Civitas

- 10 data scientists
  - 4 PhDs, 4 Masters, 1 Bachelors, 1 Intern
  - Variety of backgrounds: math, engineering, chemistry, computer science, astronomy, etc.
- Largely a research and development team
  - We have a separate data engineering and software engineering teams that handle most production work

# Data Science at Civitas

## Main duties:

- Explore new product ideas and develop working prototypes
- Support, maintain, and improve machine learning algorithms in our products
- Conduct exploratory research projects
- Communicate complicated math concepts with clients and other departments

# My Role at Civitas

- I've been at Civitas for 11 months
- My work went through these stages:
  - Started research project
  - Turned it into a dynamic web prototype
  - Added features and improved the prototype
  - Worked with customers to get feedback
  - Improved the prototype some more
  - Worked with the design team to flesh out a product
  - Worked with the software development team to advise them on how to build out the product infrastructure

# Example Project

A university wants to give free tutoring for one of their courses. Which course should they choose if they want to have the greatest impact on graduation rates?

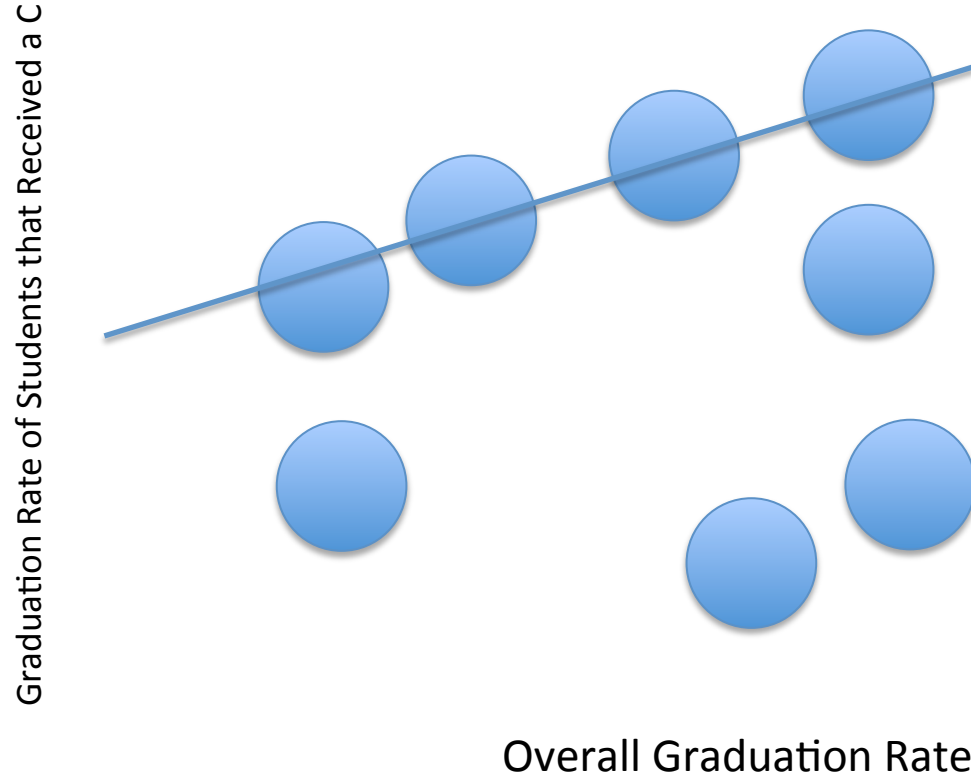
# Step 1: Figure out all the things I can calculate about a course

- Number of students that take a course
- Average term a course is taken
- Average course grade
- % A's and B's in a course
- % D's and F's in a course
- Graduation rate of students that take the course
- Graduation rate of students that do well in the course
- ...



# Step 2: Collect the Data and Explore

- Pull data from a SQL database
- Perform data cleaning, analysis, and plotting in Python



# Step 3: Derive More Complex Quantities

- We can calculate the graduation probability by grade for every course
- From there we can measure the effect that student performance improvements could have on student graduation rates

# Step 4 and beyond

- Generate a web prototype so others can explore
- Get feedback
- Work with the design team to find a good way to communicate our findings to our customers through products

# Real-world work vs. Academia

- Much more fast-paced. Need to be able to provide weekly updates on results.
- Have to learn lots of new tools on the fly all the time
- Have to mix skills much more often
- Much more collaborative atmosphere
  - Don't know how to do something; ask someone!
- Big focus on being able to turn your results into things you can describe to laypeople

## **Section IV:**

**What should I be doing to prepare myself?**

# Preparing for Data Science

There are a number of easy, useful things you can be doing now to prepare yourself just in case you need a non-academic job.

For a detailed breakdown, check out my previous talks.

# Preparing for Data Science: General Advice

- Use Python for as much work as possible
- Use SQL
- Use version control (Github)
- Take the Coursera Course on machine learning
- Practice your hacking skills
- Occasionally attend meetups or startup parties

*If you averaged 30 minutes a week of working on your technical skills during your PhD, you'd be stronger than 90% of the candidates we see.*

# Conclusions

- Be optimistic, but don't bank on an academic career
- The real world is *awesome* and can be just as stimulating as an academic career, with a lot of extra benefits.
- You can prepare yourself with a small amount of effort and become a better scientist in the process
- Reach out to any of the former UT astro data scientists if you need advice!
  - Chris Lindner, John Jardel, Julie Hollek, Sam Harrold



# Sound words of advice: Smith's Law

*“Ten to fifteen percent of astronomy PhDs are so clearly outstanding that they will have no trouble getting a job. Ten or fifteen percent are so unsuited to the career that no one in the science will ever hire them. The remaining seventy to eighty percent are so close in capability and merit that their eventual fate depends chance, timing and other factors.”*

-- Alan Whiting

<http://www.sr.bham.ac.uk/~abw/advice.html>