

# How to prepare for an academic position

*(three talks in one)*

*Andrea M. Armani*



# About me



Grew up in Memphis



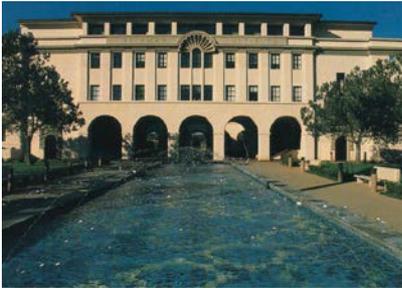
Undergrad at Univ of Chicago (Physics w/ Chemistry)



PhD at Caltech (Applied Physics with minor in Biology)



Prof at USC (primary\* in Chem Eng and Mat Sci)

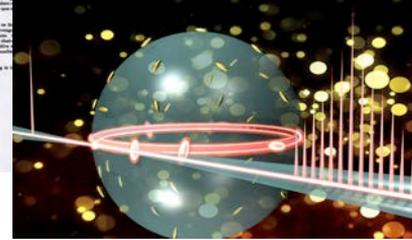


Post-doc at Caltech (Biology & Chem Eng)

# Possible topics...

## Application packet

- CV
- Letters
- Research proposal
- Teaching Statements



## Faculty interview process

- What happens?
- Things to do/not to do
- How to prepare



## Starting out

- Structuring your group
- Getting funding
- Pitfalls (and avoidance strategies)



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## Starting out

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Really need to be thinking about all three in parallel to be prepared to not just “get” a position but to excel in a position.

# The Application Packet

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# Curriculum Vita

You are interviewing to be a professor. Faculty have three jobs:

- Research
- Teaching
- Service

To show that you are ready to do this job, you should organize your CV according to these activities.

For example:

<b>Research</b>	<b>Teaching</b>	<b>Service</b>
Research positions Publications Presentations	Teaching Assistant Mentoring	Volunteer experience (SPIE!)

## Possible sections:

- Education
- Positions
- Peer-reviewed publications
- Conference proceedings
- Presentations
- Teaching
- Mentoring
- Outreach
- Service
- Awards
- Society membership

*Bold or underline your name on publications. Also, if you are in a field – like Comp Sci – where conference proceedings are peer-reviewed, then it is completely okay to merge the two sections. But in most fields, proceedings are not nearly as hard as journal publications.*

*Make sure to include “outcomes” and details. Did your undergrad mentee(s) go to grad school? Stay in engineering? And what did you do as a mentor or in the classroom?*

# Research Statement

The goal:

- Convey a vision for your research group. (Have a vision statement.)
- Explain the impact that your proposed work/group would have in the field
- Explain what you would do “first”. (choose 2-4 “challenges”)
- Explain how you will fit in to the institution

What it shouldn't do:

- Summarize everything you've already done. You're submitting a CV
- Give a 1 yr plan or a 50 yr plan (watch your scope)
- Be too narrow or too broad in the technical description (remember your audience)

Things to remember:

- **Figures are really important.**
- The audience is the whole dept – not you/your advisor/your research group

# Purpose of the Teaching Statement

What you may think this is about:

- your conception of teaching and learning
- reflection about your teaching
- your goals as an instructor and your corresponding actions in the classroom
- an opportunity to tie together the other sections of your portfolio

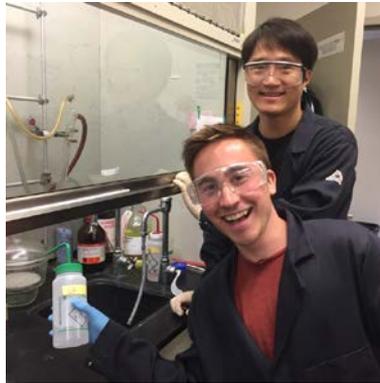
Unless you have extensive teaching experience (which you may), you probably don't have a philosophy. Additionally, while top institutions want good teachers, they don't expect you to have extensive teaching experience. (If you have it, great.)

But you have to write something?

*(Disclaimer: If you are applying to a teaching institution, then you definitely need to address these items.)*

# Teaching is more than teaching

- Teaching isn't just about coursework
- Teaching is also about mentoring undergraduates, specifically through undergraduate research
- If you have any experience working with undergrads (or mentoring graduate students, if you are a post-doc), this is the place to bring it up – and discuss your mentoring philosophy.

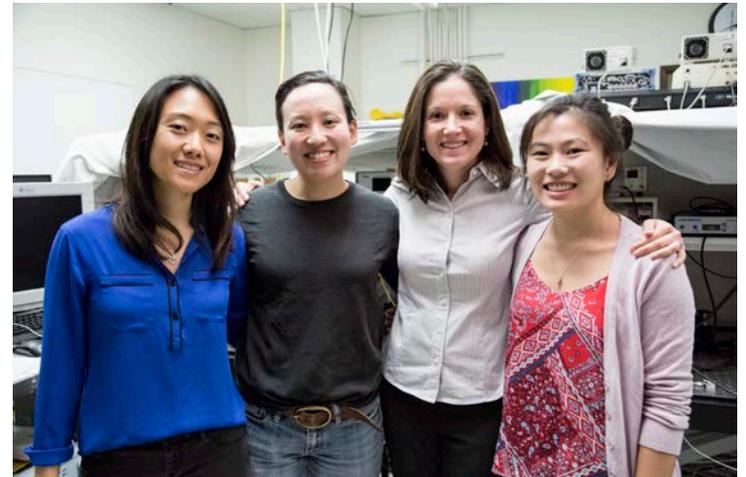


# The real purpose of the TS: #1

- To find out what you would teach in the department should you be hired. This is becoming a serious concern as departments are hiring people who don't necessarily have degrees in that field.
- If you fall in this category, answer this question, directly and succinctly. (“I would be very interested in Teaching Class XXX and YYY and perhaps developing a class on ZZZ.”)
- If you don't fall in this category, answer this question anyway – because everyone else is!

# The real purpose: #2

- To find out if you would be a good mentor to students and how you plan to mentor your students.
- Obviously, you are good researcher – or you wouldn't get rec letters and your advisor wouldn't encourage you to apply. But as a faculty member, you will not be doing the research, your students/post-docs will. So, this is your opportunity to describe how you plan to create an environment which is supportive and conducive to research. And to detail what experience you have as a mentor.



# Teaching statement format

- Keep it under 1 page
- Put it at the end of the packet
- Delineate it from the research statement with a heading
- Make sure your name is on it

**Get sample statements from friends!**

# How to make your app memorable

- Put your name on it – your name should appear on every page of your application
- Refer to the department specifically; ideally, refer to specific courses/researchers in the department/school – show you have done your research
- Compelling figures that clearly explain your points
- In addition to saying where you would fit in with the current courses/research/dept, mention specific ways you could contribute:
  - one additional course you would want to develop and how it fits in with the curriculum; you must define this course – what it would cover, why students would be interested in it, etc.
  - Resources at the school that will particularly help your research or faculty who you will collaborate with

# The Interview

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# Interview preparation

Things you can control:

## Presentation(s)

- Research (past) – like a seminar talk. ~45-50min long
- Proposed research – called a chalk talk
- Teaching a class – rarely happens, but it can

## Key things:

- Practice your research presentation with friends who will be honest with you. Spend time making your slides. Have lots of backup slides.
- Prepare for questions from audience members who are very unfamiliar with the field

## Appearance

- First impressions are very important. This is the time to get a suit which fits perfectly.

# Pre-Interview

## To do:

- Read over the department's course listing
- Learn about their central user facilities
- Learn about the primary research areas of the department and the school
- Learn about any research or educational initiatives

## To ask:

- Is it possible to meet with certain faculty members?
- Is it possible to receive a schedule before you arrive?
- What presentations should you prepare?
- Is it possible to have a tour of any central user facilities which you are interested in?

I have posted a list of questions which you may be asked during an interview and which you should ask during interviews on my group webpage, under "Advice".  
(<http://armani.usc.edu>)

# During Interview

## Do:

- Get a good night's sleep the night before
- Be yourself
- Thank everyone for meeting with you
- Pack a mini-medicine kit in your laptop bag
- Have a back-up of your presentation on a USB drive
- Remain calm throughout the day (deep breaths)
- Take notes.

## Don't:

- Drink excessively during dinner
- Pretend you know something you don't
- Argue with someone in the audience during your talk
- Jump to conclusions at seemingly inappropriate questions
- Have back-to-back interviews (interview at one school on M-T and a second on Th-F)

# During Interview

Questions you will (probably) get asked (so you need to have answers for them):

- How much space would you need? What type of space?
- Who would you collaborate with?
- Where do you see your research group heading in 10 years?
- How will you differentiate yourself from your advisor(s)?
- How large of a group do you want to have at steady state?
- Where will you get funding from?

And the most important:

- *I'm not in your field and didn't read your proposal, can you briefly summarize your proposal for me?*

# Post-Interview

Send thank you emails (or notes) to everyone you met with within 2 days, thanking them again for meeting with you

In your email to the chair, include an offer to send any additional, updated information – if anything has changed since you submitted your application

# Starting Out

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# Group Management

## Structuring a research group

- Different methods/approaches

## Roles of the advisor

- Defining how you manage your group

## Comments from students

- Actual feedback

# Defining group

To be an effective manager, you must:

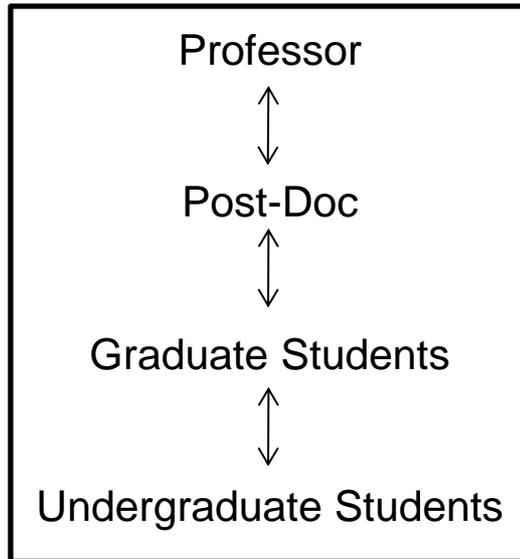
Have a **well-defined organization** (structure or chain of command) with **well-defined goals**.

Therefore, you should have a plan or rationale for your research group (size, hierarchy, interaction) before you start hiring students/post-docs. It is very hard to change it mid-stream.

Additionally, it is important to recognize that academic groups are intrinsically unstable. The “employee” turnover is high because students graduate (and leave). In industry, a 100% turnover every 5 years would be catastrophic – but it is our working reality. This needs to be accounted for in the plan.

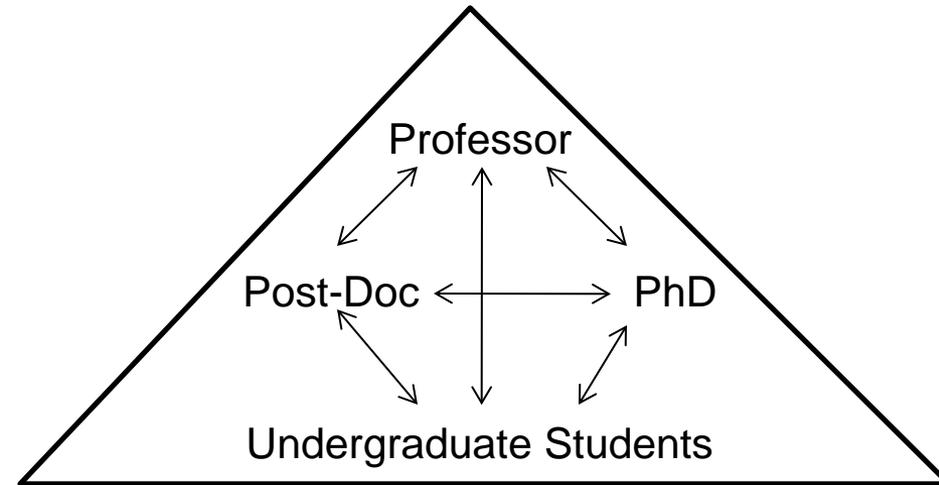
# Two examples of org structure

## Linear, top-down



- Based on having all-levels
- Requires delegation of tasks
- If one level goes missing, there are issues

## Inter-connected



- Many variations
- Very robust (less prone to failure), but requires higher faculty involvement

# Three hats of the advisor

**Chief Technical Officer (CTO):** defines the technical and scientific focus of the research group and directs/aids in its implementation.

**Chief Executive Officer (CEO):** aligns the core objectives of the research group with those of external agencies and builds a sustainable organization.

**Chief Operating Officer (COO):** manages the day-to-day business of the research group, including ensuring efficient resource allocation.

**The balance between these roles is ever-evolving.**

# Chief Technical Officer

“**CTO**”: defines the technical and scientific focus of the research group and directs/aids in its implementation.

In the transition from grad student or post-doc to faculty member, the role of CTO is the easiest to assume.

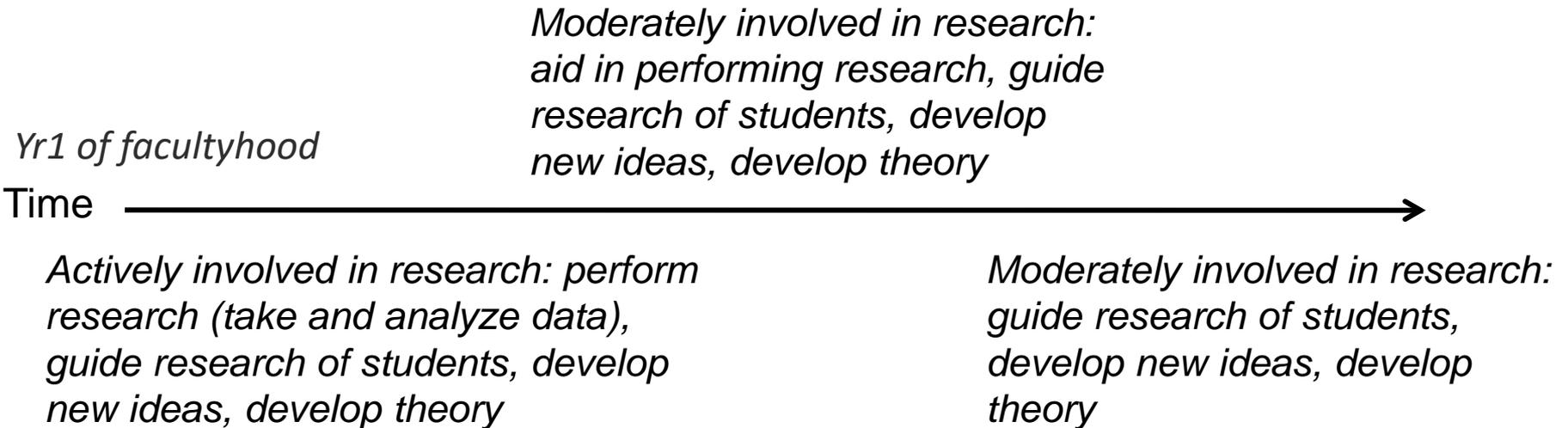
Many senior students/post-docs have already begun acting in this role.

However, as a student/post-doc, you performed all of the research. As a professor, your students and post-docs will perform the research.

**Learning to delegate is a crucial skill.**

It is important to realize that, while you are capable of doing everything, you are not able to do everything. There are only 24hrs in a day.

## Balancing your role as a CTO:



Transition from active to moderate involvement in research is dependent on many factors, including personality (yours), funding, availability of students, and type of research.

Also, relates to your management style.

# Management Style

## Micro-management

A style where a manager closely observes or controls the work of the employees. Because micromanagement can give the impression that a manager does not trust an employee, it often leads to resentment between the employee and the manager.

## “Macro”-management *(not a real term)*

A style where the manager is somewhat detached from the daily work of the employees, and focuses on the over-all goal of the organization. Because macro-management can give the impression that the manager is disinterested in the project, it often leads to the researchers being un-motivated about their work.

**It is clearly ideal to fall somewhere in the middle. However, this is not a static behavior - how you manage your group, or a given student, will evolve as that student matures.**

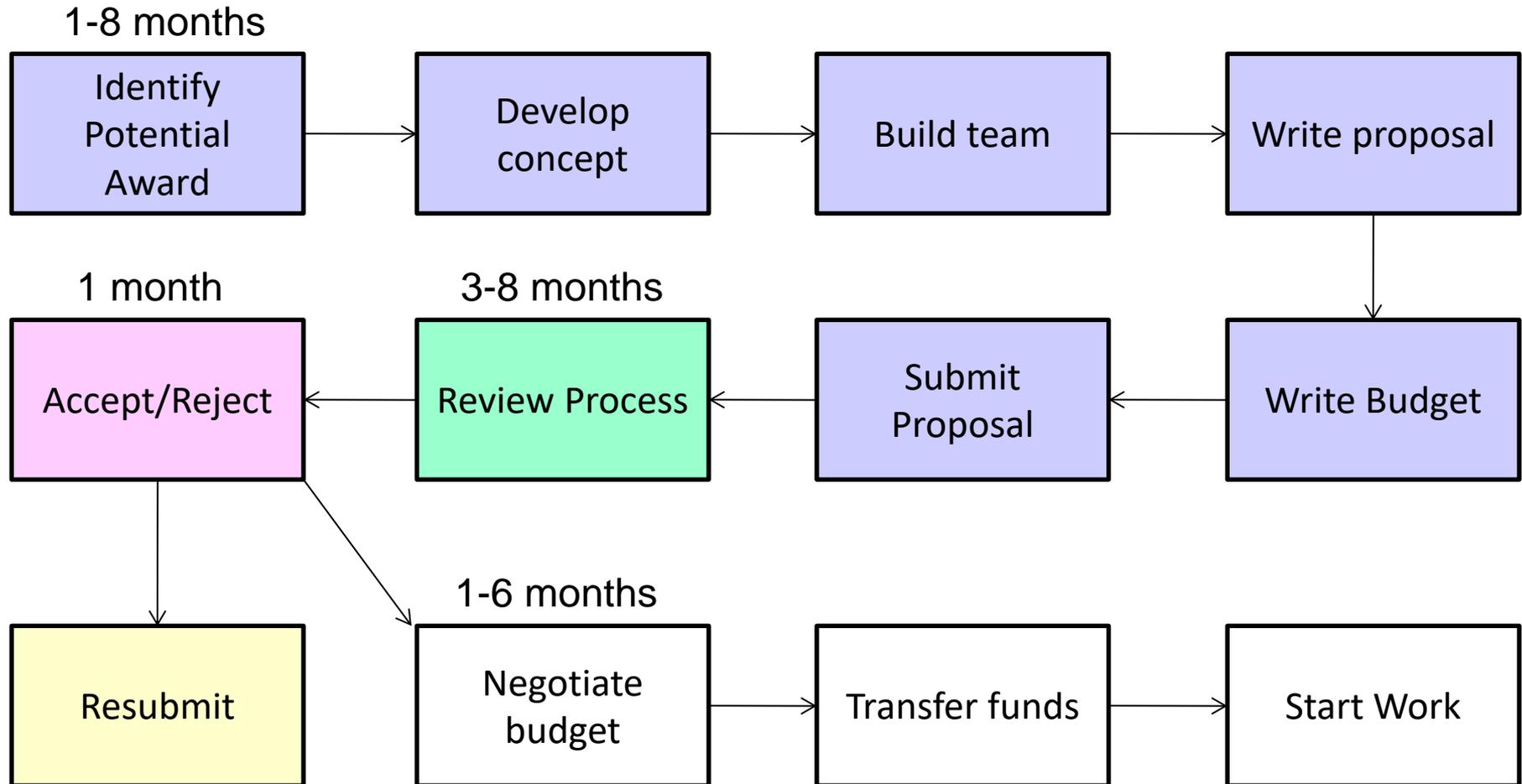
# Chief Executive Officer

While you may think your ideas are incredible, you must convince someone to fund them and you must convince your research group to work on them. You also must create an environment which is conducive to performing research.

This is your job as the CEO –

- align your research objectives with those of a funding agency
- interface with the general public on behalf of your research group
- inspire your research group – ie be a leader worthy of following

# Funding (Cliff notes version)



→ **Start to end: 7months – if really lucky. 1.5yrs is more realistic.**

→ **You need to start writing proposals as soon as possible.**

# Chief Operating Officer

Manages the day-to-day business of the research group, including ensuring efficient resource allocation. Examples of issues which can arise in the first couple years (and later):

## **Managing people**

- Personality conflicts in the lab
- Firing a student
- Student “crushes”

## **Managing finances**

- Hiring grad students vs. post-docs
- When to hire students
- What to budget for

## **Managing resources**

- Fighting over equipment
- Poor use of equipment
- Poor use of space

# Advisor: Advisee

The advisor: advisee relationship is symbiotic. I've posted a Science article on my website which has a very good discussion about this concept.

I share it with my students when they join.

If they see you working hard, they will work hard. If you are sleeping in until noon and leaving at 4pm, they will as well...

# Establishing guidelines

Many conflicts between people are the result of confusion. Companies have contracts and rules; your lab shouldn't be any different.

One way to remove confusion or perception of favoritism is by establishing “best operating procedures” or a guidebook to the lab. You can put all relevant information in there and give it to all new group members upon joining the lab and post it online for easy reference. I also have an authorship policy.

## Table of contents (from mine)

- Purpose of lab
- “To do list” upon joining
- Overview of research/funding
- Overview of resources
- Progress Reports
- Experimental Protocols
- Equipment
- Software
- Vacation policy
- Lab rules/duties/contacts
- Advice (writing papers, giving presentations)

# Managing finances

The two biggest expenses are salary/tuition and overhead.

Because your salary commitment is known (for existing graduate students at least), it is possible to create budget/expense projections, so that you will know if you can afford additional students or not.

These projections should include (at a minimum): your known/committed expenses with any anticipated salary/overhead increases and your active awards/grants.

These types of projections are very helpful when writing proposals – and when trying to determine how many proposals you should be writing. You will be surprised.

# Resources

The most fought over resource is space – don't wait until you **need** it to ask for it.

However, make sure that you have a well-thought out rationale for your space request and be somewhat flexible. Key points/questions to ask:

## **Lab:**

What is the average \$/sqft of lab space? (\$ in indirect costs) This is typically a known number and is calculated on a rolling 3 or 5yr average. For example, Prof. X has brought in \$1M in indirects over the last 5yrs and has 2000sqft of lab space (\$500/sqft). If the avg \$/sqft at Prof. X's school is \$300/sqft, then Prof. X should request more lab space...

## **Office:**

How many grad students are typically in an office and how many do you have in your current offices? Is there office space which could be shared among faculty?

Are you currently housing students in the lab because you do not have enough office space (poor resource allocation)?

# Resources: Lab Space

Identify what you **need** vs. what you **want**.

## **Example: Lab**

### **Need**

- 400sqft
- Fume hood
- Cabinetry

### **Want**

- 800sqft
- Two fume hoods with sinks and built in gas/vacuum lines
- Cabinetry
- DI water system

Approximate cost of a lab rehab ~\$1000/sqft + equipment costs

### **Meeting in the middle:**

- Request lab space with duct work for second fume hood in place. Depending on availability of funds, request second fume hood/DI system.

# Resources: Office Space

Identify what you **need** vs. what you **want**.

**Example:** Office space for students

## **Need**

- 300sqft
- Furniture (new or otherwise)

## **Want**

- 600sqft
- New paint/floor/ceiling/etc
- New furniture

Request office space and/or offer to share space.