Mark your attendance!

Research 101

Information for the Research Curious

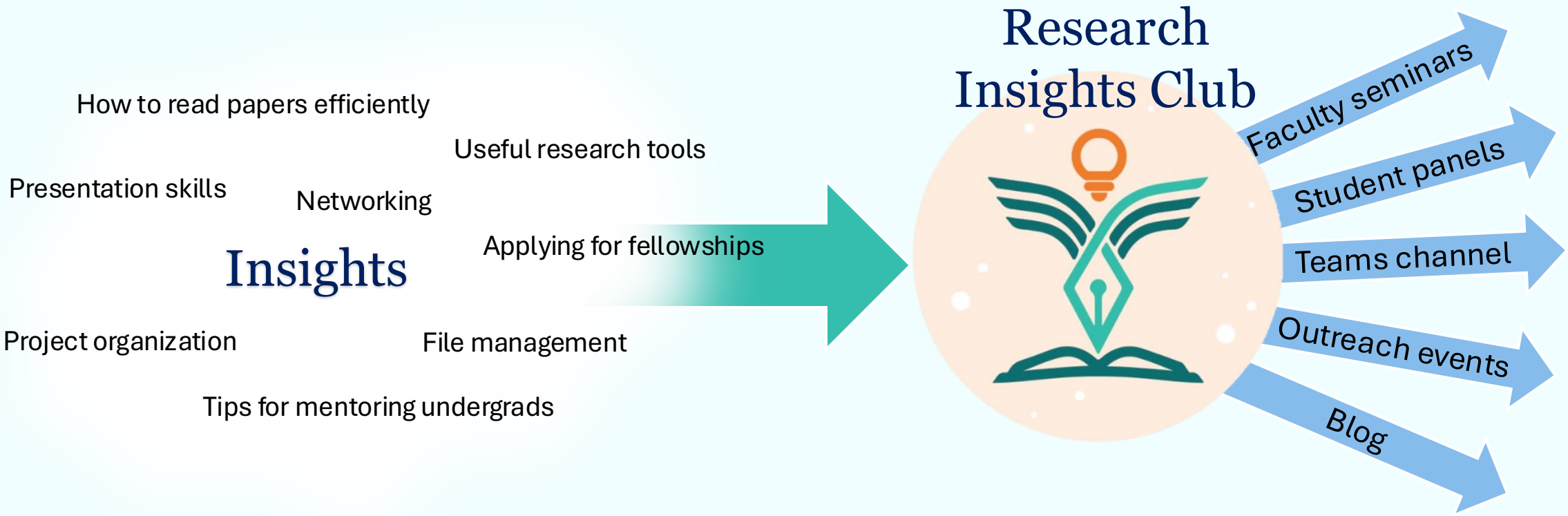
Research Insights Club

Our Purpose

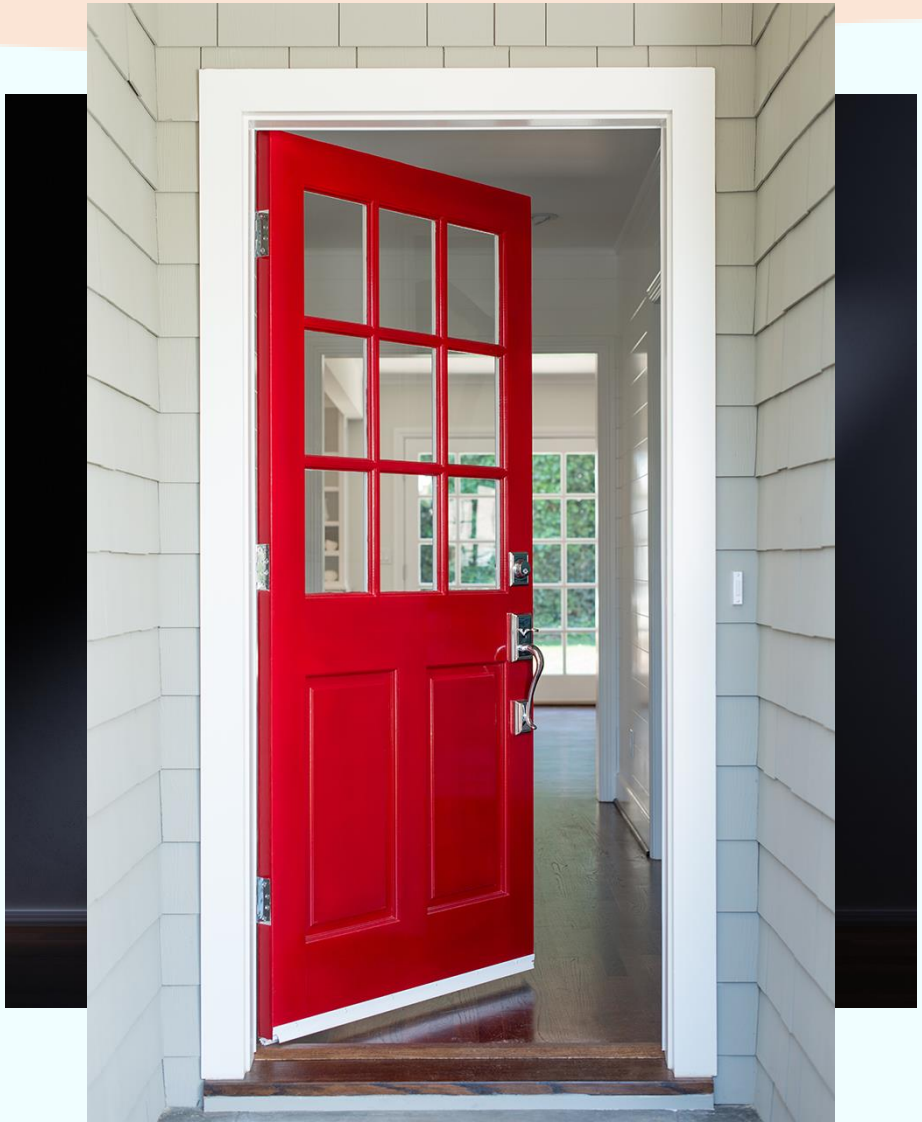
(1) To disseminate detailed and hard-to-obtain knowledge to Georgia Tech students to help them navigate and thrive in the complex field of academic research.

(2) To facilitate knowledge transfer and networking between student researchers outside their usual fields.

Implementation Strategy



Today’s goal: demystify research



What brings you here?

The benefits of research

- Work on interesting projects
  - Explore your interests
- Mentorship from professors
- Companionship from lab
- Build up resume for future research roles (Ph.D., industry)
- Writing & presentation skills will get a huge upgrade

Topics

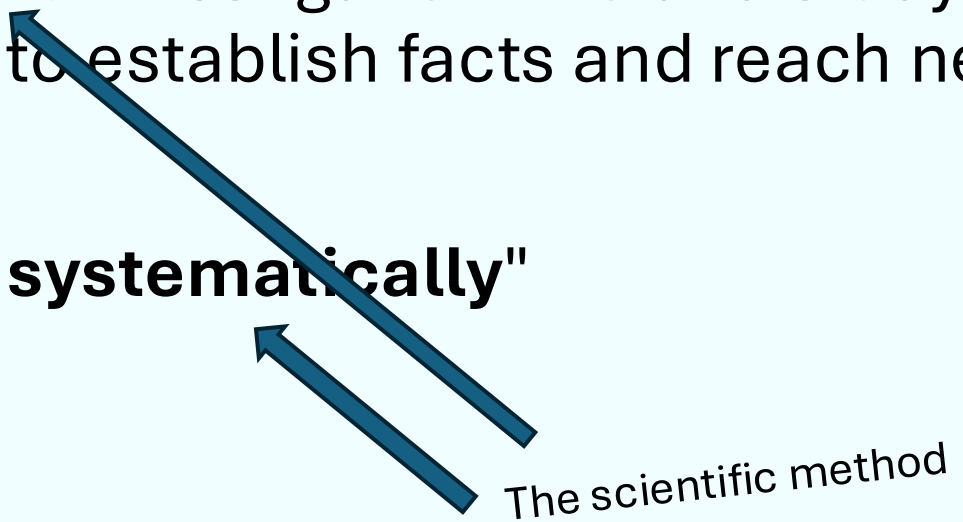
- What is research
- Who does research
  - Academic labs
- What do researchers do
  - How is research funded
- Where do researchers communicate their research?
  - Journals
  - Author order meaning
- How is the research impact of a person measured?
- Next steps: how to get involved in research

What is Research?

Research is...

n. "the **systematic** investigation into and study of materials and sources in order to establish facts and reach new conclusions"

v. "to investigate **systematically**"



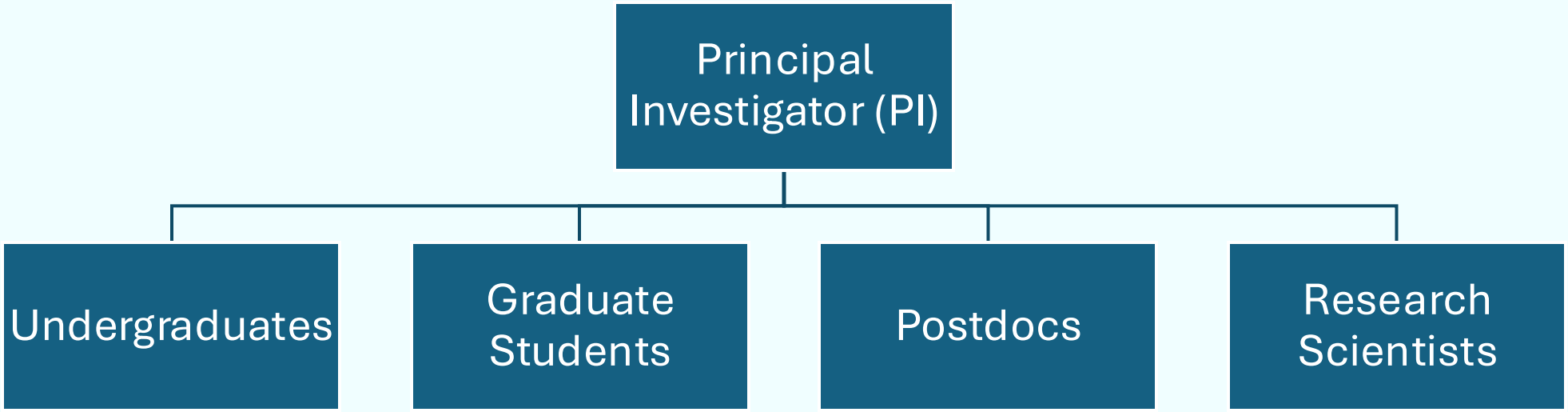
Using evidence to test hypotheses and come to new conclusions

Who does research?

- Industry
  - R&D
- Government
  - CDC
  - DoD
  - NASA
- Academics
  - Research Faculty
    - Graduate students
      - Masters, Ph.D.
      - Postdocs, research scientists
      - Undergraduates

Research Groups

The academic lab



The PI

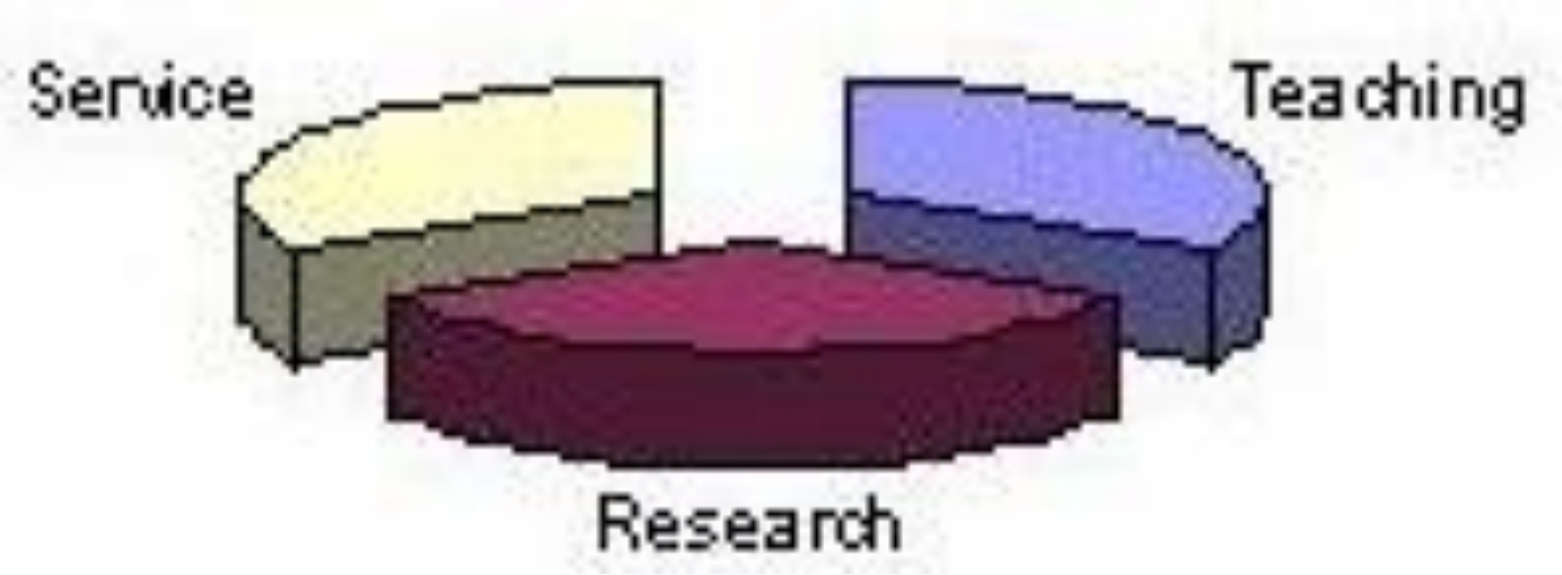
Professor/Research Faculty

“Manager” of the lab

Apply for grants, publish papers, go to conferences

- “Faculty” are the academics including professors, teaching faculty & research faculty
- “Staff” have admin or other support roles

Professors have many duties



The PI leads the lab

- Hire students & postdocs
- Mentor students & postdocs
- Decide what projects to pursue
- Make sure papers get written
- **Apply for funding**
  - Write grant proposals

PIs rarely (if ever) work in the lab!

The road to tenure is long

2-4 years

PostDoc

7 years

Assistant Professor

Goal: publish as much as possible before tenure evaluations!

5-7 years

Tenure

Associate Professor

Professor

What do Researchers Do?

Academic Researchers

- Undergraduates
- Graduate Students
- Postdocs
- Research Scientists

Typically volunteers

Employees

What do researchers do

- They **do** the research

Not a professor in sight

Research can be experimental or computational/theoretical

What to expect from research as an undergraduate

- Assist a graduate student or postdoc
  - Training, shadowing
  - Reading papers, learning about the field
  - Perform your own task
    - Experiment
    - Create a tool
- Gain independence over time
- If you do enough, you can become a co-author or present at a conference

Publishing & Conferences

Journal articles: the currency of research

- aka “research paper”
- Article in a scientific journal
- Two types
  - Primary research
  - Reviews
- Found on research databases
  - Google Scholar
  - PubMed
  - Elsevier
- Peer-reviewed
  - 2+ experts thoroughly read and “signed-off” on your paper

Examples of Journals

The structure of a research paper

- Abstract
- **Introduction**
- **Methods**
- **Results**
- **Discussion**
- Conclusion
- References
- Supplemental Information

Paper example

1st author – did the most work*

Last author – the PI*

*This can vary depending on the field

Question: what is the name of the journal?

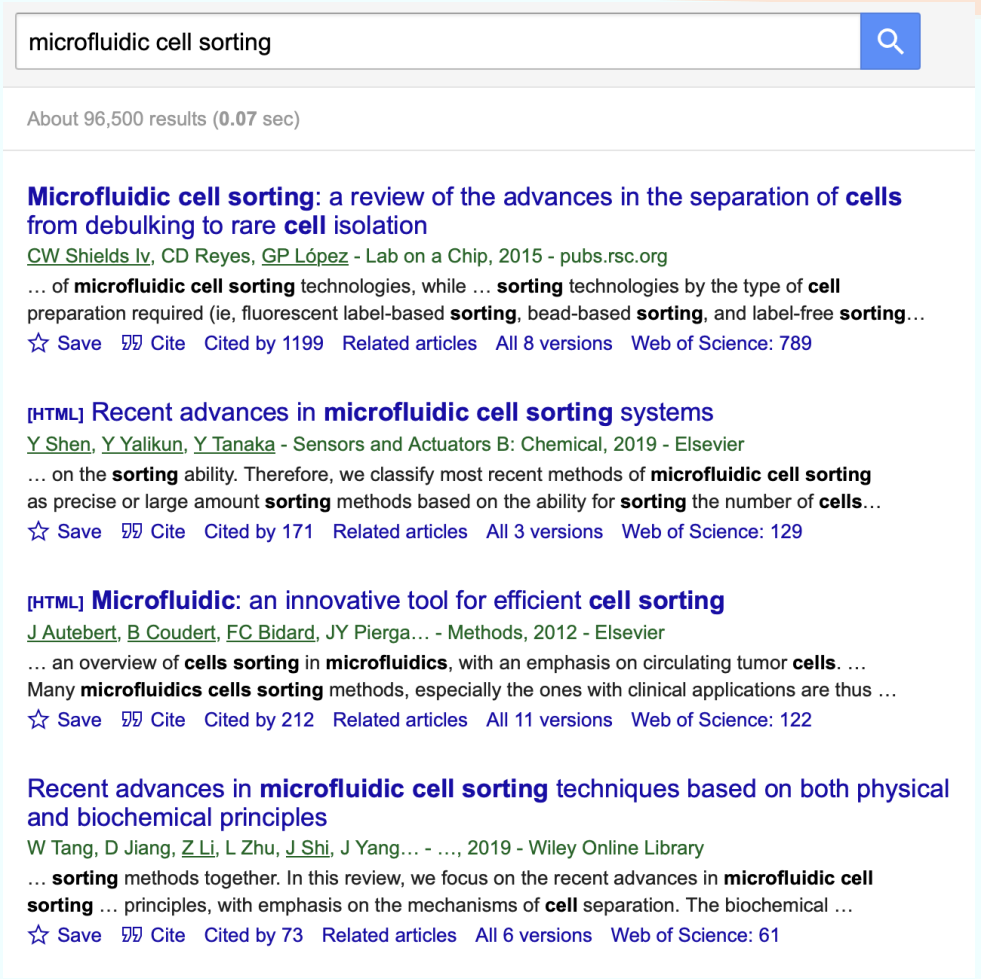
Research impact: citations (for better or worse)

- Citations are references to your work
- Impact metrics:
  - Individuals – h-index
    - The highest number of a person's papers with at least that number of citations
  - Journals – Impact Factor

$$\mathrm{IF}_y = \frac{\mathrm{Citations}_y}{\mathrm{Publications}_{y-1} + \mathrm{Publications}_{y-2}}$$

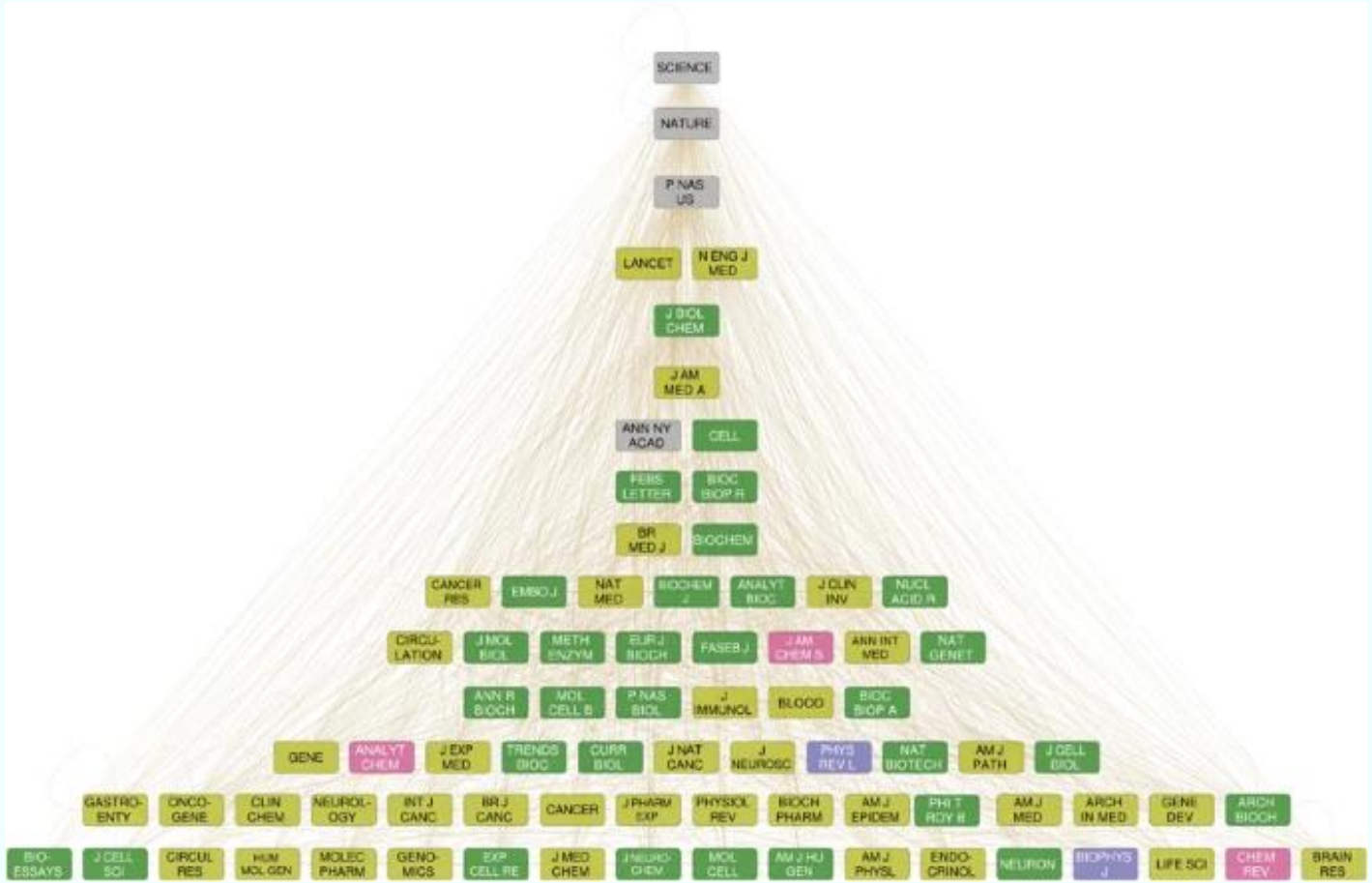
Example: Nature

$$\mathrm{IF}_{2017} = \frac{\mathrm{Citations}_{2017}}{\mathrm{Publications}_{2016} + \mathrm{Publications}_{2015}} = \frac{74090}{880 + 902} = 41.577$$



Note the citation counts

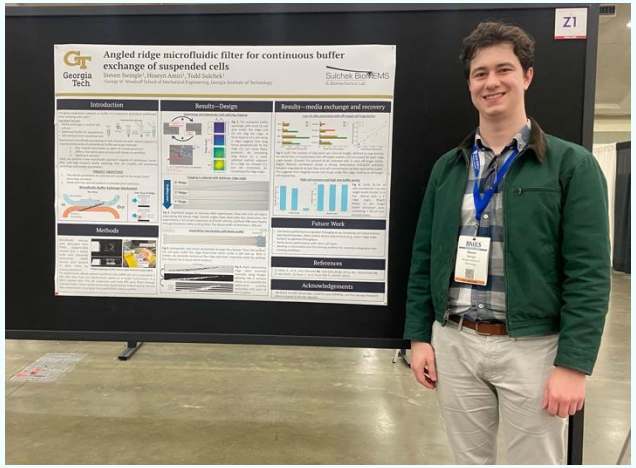
Journal “hierarchy”



Note: higher journal doesn’t mean better research. Sometimes impactful projects are split up into multiple publication in smaller journals

Conferences

- Field specific
- Students (sometimes profs.) submit abstracts & present their research
  - Oral presentation
  - Poster
- Networking



Starting Your Research Journey

I’m interested! Now what…?

- Learn about labs and their projects
  - Department website
    - Research
      - Research area
        - Faculty
          - Lab websites
- Reach out & apply
  - Email professors
    - Make sure you follow instructions on their website!
  - PairMe
    - Search “pairme gatech”

Advice

- Have an idea of what you're interested in
  - More specific than "wet lab"
- When emailing professors:
  - State what interested you and made you want to reach out
  - Don't feel impostor syndrome. Say "I found _____ interesting and am looking to learn more in your lab."
- Be curious! Learn. Then steer your ship.

Questions?

If interested in RIC

- Fill out interest form!
- We'll reach out depending on what you select