Theory CS Research

January 27th, 2020




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WHAT IS TCS RESEARCH

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What does it require from students? Time, effort, interest, and a willingness to learn!




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GEORGIA TECH PROFESSORS

Prof. Eric Vigoda (Sherry, Samarth)

Prof. Dana Randall (Sherry)

Prof. Santosh Vempala (Shyamal, Rares)

Prof. Richard Peng (Daniel, Animesh)

Postdoc Greg Bodwin (Shyamal)

PhD Samantha Petti (Shyamal)

Prof. Jake Abernethy (Arvind, Neil)

Prof. Prasad Tetali (Daniel)

Prof. Mohit Singh

Prof. Rachel Cummings (Ankit)

Prof. Josephine Yu (Daniel)

Prof. Grigoriy Blekherman (Shyamal)

HOW TO ASK FOR RESEARCH

- Email - varying effectiveness
  - Set up a meeting
  - Be specific (about goals, experience, interests)
- If you're taking his/her class
  - Office hours
- If you're not taking his/her class
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  - Set up a meeting
- Read papers and have something to talk about

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STYLES OF RESEARCH SUPERVISION

- **Infrequent (hands-off)**
  - Few meetings in the semester
  - **Pros:** Most amount of freedom in what you investigate and how. Can be low intensity
  - **Cons:** Generally up to you to solve the problem, lack of guidance can mean little progress. Easiest to avoid responsibility
- **Moderate**
  - More regular meetings: one per 1-2 weeks
  - **Pros:** Decent amount of freedom while making sure you do not get stuck. Enforces a soft schedule
  - **Cons:** Still might get stuck


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  - 1-2 meetings a week
  - **Pros:** Won't get stuck for long periods of time
  - **Cons:** Less autonomy over research direction. May have less actual contribution to the project
- **Collaborative**
  - TCS research at the undergraduate level tends to skew more to working alone
  - Collaborateurs in the sense that you are both working on the same problem, but different avenues

(Tactfully) suggest a research style when you begin a research project with a professor!

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What is an REU?

- An REU (Research Experience for Undergraduates) is a **summer** program that pairs undergraduates with research mentors to work on a research project!
- Usually last 6-8 weeks.
  - Usually "moderate" - "frequent" research styles
  - More collaboration
- Provide a stipend (from the NSF)
  - Most REUs also provide some form of housing and meals.
  - For **international** students, options for REUs are more limited due to funding restrictions. Alternate sources of funding are often available, but more competitive.

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What is an REU?

- Can be **very competitive** just due to the sheer amount of applicants compared to how many can be accepted out of those.
  - Be competitive by having research experience, advanced coursework, demonstrate novel thought.
  - Some REUs are aimed at first-time researchers: coursework/letters important for these.

- https://web.math.princeton.edu/~lji/reus/

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Applying to REUs

- Most REU apps are due sometime in **February.**
- Most math programs use the following website to apply: **MathPrograms.org**
- An application requires:
  - Personal information, sometimes a CV/Resume
  - Transcript (unofficial transcript is usually ok)
  - Personal/Research statement
  - 1-3 Letters of Recommendation (usually 2)
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REUs for Theory CS

- Clemson coding theory/crypto REU: for beginner researchers
- DIMACS
- CAAR (University of Maryland)
- CalTech's SURF: accepts international students.
- CUNY Discrete Geometry REU

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- You like research
- You want to get into a competitive PhD program
  - At minimum, you want two research experiences, or at least two people that can write strong recommendation letters for you that speak to your **research ability**
  - Strong PhD applicants may have 3 or more research experiences.
  - Some PhD programs (more so in math) are skeptical of letters/results that come out of REUs.
    - Try to get at least one research project at Gatech that spans multiple semesters.

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