CS Research Information Session (abridged version)

Slides Courtesy of Professor Brad Solomon

Session Overview

- Identifying research areas
- Contacting faculty (Through organizations or individually)
- Summer research opportunities
- Q&A

Specialize your education (study topic of interest to you)

Example: Machine Learning

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David Dalpiaz

Computational Statistics, Reproducible Research, Statistics Education, Machine Learning

Katherine Driggs-Campbell, Electrical & Computer Engineering

Autonomous Vehicles, Validating Autonomous Systems, Interactive Control Policies for Intelligent Systems in Multi-Agent Settings

Heng Ji

Natural Language Processing, especially on Information Extraction and Knowledge-driven Natural Language Generation, Text Mining, Knowledge Graph Construction for Scientific Discovery

Tandy Warnow

Machine Learning in Computational Genomics, Ensemble Methods, Statistical Estimation

Jiaxuan You

Machine Learning for Graphs and Databases, Foundation Models, Large Language Models, Generative AI, AI Agents

Tong Zhang

Machine Learning Theory and Applications, Optimization, Reinforcement Learning, Robustness, Generative AI, Large Language Models

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Decide if a field of study is right for you

Its normal to try different things or not know what area is right for you!

Brad's Experience: As an undergraduate I did research with…

Astrophysics (Didn't have a good understanding of the math)

Wet Lab Biology (Research took too long / too much human error)

Biological Engineering (Was fun! In-silico systems modeling for ~2 years)

Then I went to grad school and never did any of this again.

Contribute to collective knowledge

The act of discovery can be its own reward!

If you are specific enough, you can become the best in the world**!

Patent your idea and get a miniscule fraction of the money!

Prepare for graduate school

Research requires a lot of skills:

Reading and understanding academic papers

Identifying problems and coming up with solutions

Proposing novel ideas with clarity and brevity (writing AND presentations)

Actually doing the highly skilled work in your field!

Prepare for graduate school

Your mentors (and research experiences) can help you get these skills!

… as well as write you recommendation letters

… as well as suggest graduate programs to attend

… and if you stay in touch, can be a part of your network in the future!

Benefits of Undergraduate Research

- Specialize your education (study topic of interest to you)
- Decide if a field of study is right for you
- Contribute to collective knowledge
- Connect with faculty mentors
- Prepare for graduate school

Questions?

Identifying Research Areas

So you want to do research… but what kind of research?

Audience Poll

How many of you know ***specifically*** want you want to do research in?

Attend research events on campus

Frequent Research Events

- Campus Research Calendar – University-wide resource
- Siebel School Speaker Series – Invited speakers across CS disciplines

Major Research Events

- Engineering Research Fair – September 23 (Happened already!)
- Trick or Research – November 6
- Engineering Open House – April 4 – 5
- Undergraduate Research Week – April 20 – 26

Project-Based Courses

A course project gives you an opportunity for structured learning that you can use a demonstration of knowledge later!

CS 222 Software Design Lab
CS 411 Database Systems
CS 415 Game Development
CS 417 Virtual Reality
CS 425 Distributed Systems (4-hour section only)
CS 427 Software Engineering I
CS 428 Software Engineering II or CS 429 Software Engineering II, ACP
CS 437 Topics in IOT
CS 465 User Interface Design
CS 467 Social Visualization
CS 492 / 493 / 494 Senior Project I & II
CS 598 DHT Conversational AI

Many early core honors courses are now project-based!
CS 397 / CS 497 – Individual Study / CS Team Project

Join a Research-related RSO

AI @ UIUC

URSA (Undergraduate Research in Scientific Advancement)

ACM Special Interest Groups (SIGs)

Search for others using: https://one.illinois.edu/club_signup

Join a Research-related Program

NCSA SPIN - NCSA Student Pushing Innovation

CS STARS - CS Student Ambassadors / Research Scholars

URAP - Undergraduate Research Apprenticeship Program

ISUR - Illinois Scholars Undergraduate Research

MUSE - Mentoring Undergraduates in Science and Engineering

Most of these programs have applications and require *some* knowledge of interests

Identifying Research Areas

Explore faculty websites!

https://siebelschool.illinois.edu/research

Research Areas

- Architecture, Compilers, and Parallel Computing
- Artificial Intelligence
- Bioinformatics and Computational Biology
- Computers and Education
- Data and Information Systems
- Interactive Computing
- Programming Languages, Formal Methods, and Software Engineering
- Scientific Computing
- Security and Privacy
- Systems and Networking
- Theory and Algorithms

Interested in working with me?

If you are an undergraduate student and would like some research experience, please send email with your transcript and CV, and indicate which papers of mine you have read and why they interest you. Most importantly, please note that undergraduate projects require substantial coding skills.

Undergraduate research: Drop me an email with your resume and a transcript.

Identifying Research Areas

- Attend research events on campus
- Take advantage of project-based courses
- Join a research-related RSO or affiliated program
- Explore faculty websites

Questions?

Contacting Faculty

So you’ve figured out an area of study… what now?

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So you’ve figured out an area of study… what now?

Email faculty you want to work with!

Audience Poll

How many of you have emailed faculty asking for research opportunities?

When should I email faculty?

- Faculty are extremely busy!

Good times to email:

- ~1-2 weeks **before** the start of the semester!
- Right **after** a major research event or talk!
- At the beginning of a week / at the beginning of the day* (Personal Pref)

When should I email faculty?

- Faculty are extremely busy!

Bad times to email:

- ~1-2 weeks **after** the start of the semester!
- Unless requesting to meet at event, don't email before an event.
- Early / late evening* (Personal Pref – I’ll read it and forget about it!)

How should I email?

- If you are lucky, their website will tell you what information they want!

If not, make sure your first email shows that:

- You are interested in working with them **specifically**
- You have the background needed to work in their field (within reason)
- You can write a clear succinct email (don’t overdo it!)

… They didn't respond

- This is honestly pretty normal for UIUC!

Wait 3-7 days:

- Follow up by replying to the original email
- Be polite and to the point “I am following up on my earlier email…”

If no response, don’t email again.

Contacting Faculty: Writing the ‘cold-call’ email: when and how

- Try to email when you expect the professor to have time to respond
- Make sure your email is personalized and to the point
- If you don’t get a response, follow up exactly once

Questions?

External opportunities

UIUC is a very large school – it can be hard to get undergrad research!

You may be too busy during the semester to juggle research too!

Consider applying for Summer Research Experiences for Undergrads!

Summer REU Benefits

- A great alternative to internships
- An opportunity to travel
- Networking opportunities
- Projects usually have clear capstone / conclusion

Beware: Applications are due earlier than you expect!

Argonne National Lab Seasonal Internship Program

About (https://www.anl.gov/education/seasonal-internship-program)

Argonne's Seasonal Internship program encourages undergraduate students to pursue science, technology, engineering, and mathematics (STEM) careers by providing research internships. A student will spend the first week of his/her Argonne experience with an Argonne staff member devising a research strategy and attending mandatory safety classes. For the next few weeks, the supervisor will provide considerable program assistance and guidance to implement the research plan. Subsequently, the student will be required to give a poster presentation at the end of their appointment. In addition to their research activities, participants attend a series of weekly seminars and tours dealing with current topics in science and engineering as well as career development.

Eligibility [Open now! Due October 25th]

Must be currently enrolled as a full-time undergraduate student at an accredited institution. Undergraduate cumulative minimum grade point average (GPA) of 3.0 on a 4.0 scale. U.S. citizen or Legal Permanent Resident at the time of applying and 18 years or older at the time the intership begins.

CS Summer Research Program

About (https://cs.illinois.edu/research/undergraduate-research/srp)

This hybrid program will take place from June to August (exact dates TBD). Students who participate in the summer program engage with a faculty and their research group as well as attend weekly 'Lunch and Learn' sessions which focus on various professional development topics.

This is not a paid program – it serves as a ‘common app’ for matching students to faculty and a support and social structure for undergraduate students over the summer. Actual hiring is still handled directly by faculty individually.

Eligibility [Rolling acceptance – no fixed deadline]

Open to all undergraduates (Illinois CS and external), iCan students, and local high school students.

CRA-WP Distributed Research Experiences for Undergraduates (DREU)

About (https://cra.org/cra-wp/dreu/)

A highly selective program that matches students with a faculty mentor for a summer research experience at the faculty mentor's home institution. DREU interns will receive $700 per week for research (up to 10 weeks), and will be directly involved in a research project and interact with graduate students and professors on a daily basis. This experience is invaluable for those who are considering graduate school; DREU will provide a close-up view of what graduate school is really like and increase interns' competitiveness as an applicant for graduate admissions and fellowships.

Eligibility [Early Action: December 15th; Regular: February 15th]

Students who are pursuing an undergraduate degree at an institution in the U.S. or its territories. International Students may apply, however, most of the funds for the DREU program are restricted to US citizens and permanent residents, so the number of non-US student participants will be limited. Priority will be given to persons from populations underrepresented in computing including women, Black/African American, Native American/Alaskan Native/ Pacific Islander, Hispanic/Latinx, LGBTQAI+, Persons with Disabilities, and Veterans.

DaRin Butz Foundation Research Scholars

About (https://isur.engineering.illinois.edu/darin-butz-foundation-research-scholars/)

DaRin Butz Foundation Research Scholars conduct research in the areas of computer science, aerospace, electrical, computer, materials science, nuclear engineering, physics, or astronomy. Scholars will work with faculty mentors who will supervise, guide, and instruct them on their research during the course of the project. They are expected to do research 30–35 hours per week for 10 weeks in summer. Scholars must take ENG 199 UGR in the fall and will present their work in the Fall Engineering Research Fair or the annual ISUR poster expo in the spring semester.

Eligibility [Open January 15th, due March 31st, Notified April 15th]

Must be:

- A University of Illinois woman undergraduate in the Grainger College of Engineering
- U.S. citizen or permanent resident
- Rising sophomore, junior, or senior majoring in CS, aerospace, electrical, computer, materials science, nuclear engineering, physics, or astronomy with a GPA of 3.0 or higher

SIAM-Simons Undergraduate Summer Research Program

About (https://www.siam.org/students-education/programs-initiatives/siam-simons-undergraduate-summer-research-program)

Society for Industrial and Applied Mathematics (SIAM) is pleased to announce we are accepting applications for the SIAM-Simons Undergraduate Summer Research Program, which will provide research, networking, and mentorship opportunities to U.S. students from underrepresented groups. Participating students will receive a stipend of $1,000/week and will have their housing, meals, and travel expenses paid. This is an amazing opportunity for students to immerse themselves in applied math, computational science, and/or data science research while simultaneously participating in professional development and community-building activities designed to foster a strong sense of belonging.

Eligibility [Application Opens November, Closes ~February*]

Must be a U.S. citizen or permanent resident and an undergraduate student enrolled in a US-based college or university in September 2024. Note that while all projects will have an applied math and/or computational science approach, students do not need to have an applied math background to apply. Projects appropriate for students at all undergraduate levels will be available, and prior research experience is not required.

What questions do you have for me?