Session 3: Process of a PhD Application Preparation

Thursday, September 26, 2024 (7pm ET)

Session 3 Learning Objectives

- Session 2
  - Preparing a strong PhD application (general guidelines)
- Identify what <u>you</u> are looking for in a PhD program
- Identify potentially <u>suitable</u> programs
- Understand the admissions process

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Your SOP comments

Abstracting top suggestions made

- use assertive, active, and **positive** language ("I plan to start" and not "I hope to start")
- style of the introductory paragraph varies; often a personal choice (but don't start off with a story of your childhood)
- don't bury important messages
- emphasize your strengths, not your weakness
  - address an apparent weakness in your record directly in an informative way (better than have a reader guess)
  - common weaknesses: poor grades, gaps, research ability/potential are unclear
- in descriptions of projects, be outcome oriented
  - describing tasks in detail can be tempting but is generally distracting

- don't let the reader guess (e.g., "the results of my project were not significant" why?)
- be judicious about what technical details and skills you discuss
- discuss what problems interest you (not ones that don't interest you)
- share a strong personal motivation for getting a PhD
- tailoring the last 1-2 paragraphs to each school is good
  - make sure to scrub remnants of other schools
  - keep tailoring to the last 1-2 paragraphs only
- more on your writing
  - pay attention to the flow in paragraphs and the overall document (e.g., limit the number of timeline jumps)
  - spell out abbreviations
  - have someone check for poor language, typos, overly long and awkward sentences, etc.

Reading the comments in the files gives a good perspective on different views and common themes.

Thank you for your contributions!

CDGrad4US Entry survey administered by the external evaluator (Center for Evaluation & Research for STEM Equity @ University of Washington)

email from

From Name: Erin Carll
From Email: noreply@qemailserver.com
Reply Email: ecarll@uw.edu
Subject: CSGrad4US Evaluation Survey

We appreciate your participation! Please check your spam folder if you have not seen the email.

Identifying PhD Programs:
Understanding Your Plans, Goals, Needs, Wants

- What are your research interests?
- What are your post-graduate aspirations?
  - An academic career? Teaching or research focused?
  - Career in a government research lab?
  - Industrial research or entrepreneurial career?
- What is your level of academic/professional preparedness?
  - Different CISE PhD programs can have different prerequisites
  - How can preparedness/skill gaps be overcome?
- What are other personal or professional commitments?

Identifying Your Research Area

- Stated interests are not a final commitment **BUT** they impact:
  - how the admission committee views your "fit"
  - which faculty will review/see your application
  - which faculty can be your champion

- Identify one to two research areas:
  - Should be research areas in the department
  - Indicating subareas helps; do not state your thesis topic

- What are your interests? What are your strengths?
  - For example, developing systems or methods, experimental design, theoretical or analytical foundations, case studies

How specific should my research interests be?

Depends on the area, popularity of the area, your interests and background. Examples:

- "*programming languages*" may be specific enough if explained why; PL does not have too many applicants; not all departments have PL faculty

- "*security*" is too vague as it includes systems, networking, privacy, crypto, software, databases, and more

- "*AI/ML*" without more focus on subareas and specifics may result in the application not getting much attention
    - Foundational AI/ML research or applications of AI/ML to area X?

Research Interests: Definitive vs Unsure

- Most programs expect applicants to have definitive research interests
    - Students are admitted to work with a specific professor
    - Includes most top programs
    - Students may change area after more research or course exposure

- Some programs accommodate switching areas better than others
    - May admit students more holistically to the program
    - May have infrastructure to support student transitions

- Having a 3-year Fellowship gives you flexibility
    - More time to find your research area/advisor
    - Easier to switch adviser (if need arises)

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Career Goals May Impact Your Decisions about Research Areas and Programs of Interest

- **PhD career opportunities** (covered in Session 1)
  - Industrial or national laboratory positions (research, development, or entrepreneurial)
  - Academic positions (research or teaching oriented)
  - Non-profit or policy positions

For example:

- If interested in a teaching focused position, favor programs with teaching opportunities for PhD students.
- If interested in a position in a government lab, favor programs with active ties and collaborations with government labs.

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Consider Your Career Goals
(A 1-Minute Individual Exercise)

Different PhD programs can provide different preparation for a career after the PhD.

Considering your current post PhD career goals, how will/may these goals influence your program choice?

Finding Suitable PhD Programs

1. Understanding what you should consider (and how much)

1. Identifying programs that align with your considerations

Institution Types

- Research Activity Level (2025 Carnegie Classification):
  - R1: Very High Spending & Doctorate Production
    - at least $50 million on R&D and at least 70 research doctorates.

  - R2: High Spending & Doctorate Production
    - at least $5 million on R&D and at least 20 research doctorates.

  - R3: Research Colleges and Universities
    - at least $2.5 million on R&D

- Public vs Private

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Program Types

- **Computer & Information Science and Engineering (CISE)**
  - Departments, Schools, or Colleges

- Faculty Size:
  - small (less than 16)
  - medium (16-30)
  - large (more than 30)

Faculty Types

- **Tenured/Tenure-track (T/TT) Faculty**
  - Assistant Professors, Associate Professors, and (Full) Professors
  - Illustrious ranks include "Chaired", "Distinguished", "Endowed", "University" professorships

- **Other Faculty Types**
  - Teaching Professors, Lecturers, Instructors, Research scientists, research professors, post doctoral scholars, courtesy faculty
  - May collaborate with T/TT faculty or even mentor PhD students
  - Typically cannot serve as PhD adviser (co-adviser possible)
  - Generally not involved in admissions

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Factors to Consider

micro

macro

PhD Advisor, Research Lab	research activities and impact ● funding ● alumni placement ● collaboration network ● …
Institution, Department, Program	research strengths ● reputation ● size ● student life ● academic culture ● financial support ● alumni success ● …
Geographic location	cost of living ● politics ● safety ● climate, culture ● quality of life ● …

CISE Research Impact:
An NSF Perspective

- Publications, conference papers, and presentations

- Technologies, techniques, inventions, patents, patent applications, and/or licenses

- Other products, such as data, databases, or datasets, physical collections, audio or video products, software, models, educational aids or curricula, instruments or equipment, research material, interventions (e.g., clinical or educational), or new business creation.

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Identifying Research-Impactful Faculty and Programs in your Area

Top down: find active programs, then identify interesting faculty from those programs

- Use resources like program rankings to identify key programs

Bottom Up: find active faculty, then identify their home programs

- CISE researchers primarily target conference publications
- Conference (and journal) quality can vary greatly
- Use resources like conference rankings to identify key venues
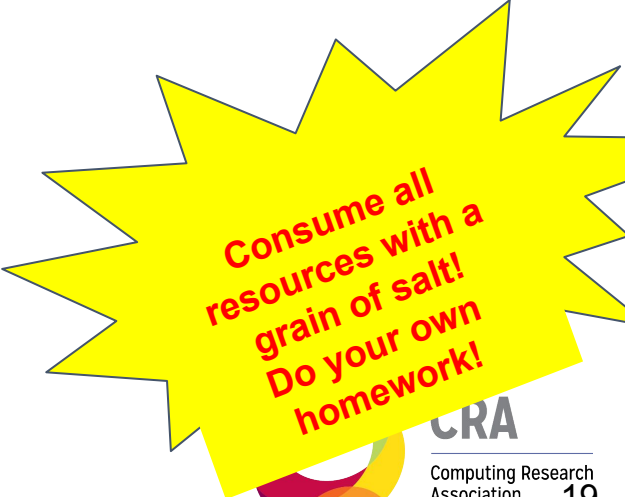- Use digital libraries to identify actively publishing faculty for those venues

A recommended approach:

2. Identify at most two to three potential research areas
3. Use top-down approach to narrow search space with broad sweeps
4. Use specific bottom-up probes to identify outliers and for refined searches
5. Augment findings with other supplemental information from faculty websites, mentor consultations, etc. … including ChatGPT!

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Some Useful Resources

- Program Rankings:
    - U.S. News and World Report, based on reputation survey
    - CS Rankings, based on publications in select venues
    - CS Open Rankings, based on US News, CS Rankings, placement and awards
        - Rankings may include (potentially outdated) faculty listings with areas

- Conference Rankings
    - Best Computer Science Rankings
    - CORE Computer Science Conference Rankings
    - Google Scholar Top Publications

- Publication Libraries and Other Tools
    - ACM Digital Library, IEEE XPlore
    - Google Scholar, ChatGPT

Consume all resources with a grain of salt! Do your own homework!

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CSRankings: Computer Science Rankings

CSRankings is a metrics-based ranking of top computer science institutions around the world. **Click on a triangle (▶)** to expand areas or institutions. **Click on a name** to go to a faculty member's home page. **Click on a chart icon** (the 📊 after a name or institution) to see the distribution of their publication areas as a bar chart. **Click on a Google Scholar icon** (📖) to see publications, and **click on the DBLP logo** (▸) to go to a DBLP entry. *Applying to grad school? Read this first.* For info on grad stipends, check out CSStipendRankings.org. **Do you find CSRankings useful? Sponsor CSRankings on GitHub.**

Rank institutions in [USA ▼] by publications from [2014 ▼] to [2024 ▼]

All Areas [off | on]

AI [off | on]
- ▶ Artificial intelligence ☑
- ▶ Computer vision ☑
- ▶ Machine learning ☑
- ▶ Natural language processing ☑
- ▶ The Web & information retrieval ☑

Systems [off | on]
- ▶ Computer architecture ☑
- ▶ Computer networks ☑
- ▶ Computer security ☑
- ▶ Databases ☑
- ▶ Design automation ☑
- ▶ Embedded & real-time systems ☑
- ▶ High-performance computing ☑
- ▶ Mobile computing ☑
- ▶ Measurement & perf. analysis ☑
- ▶ Operating systems ☑
- ▶ Programming languages ☑
- ▶ Software engineering ☑

Theory [off | on]
- ▶ Algorithms & complexity ☑
- ▶ Cryptography ☑
- ▶ Logic & verification ☑

Interdisciplinary Areas [off | on]
- ▶ Comp. bio & bioinformatics ☑
- ▶ Computer graphics ☑
- ▶ Computer science education ☑
- ▶ Economics & computation ☑
- ▶ Human-computer interaction ☑
- ▶ Robotics ☑
- ▶ Visualization ☑

#	Institution	Count	Faculty
1	▶ Carnegie Mellon University 🇺🇸 📊	21.6	185
2	▶ Univ. of Illinois at Urbana-Champaign 🇺🇸 📊	15.9	125
3	▶ Univ. of California - San Diego 🇺🇸 📊	14.5	132
4	▶ Georgia Institute of Technology 🇺🇸 📊	11.9	143
5	▶ University of Michigan 🇺🇸 📊	11.1	106
6	▶ Univ. of California - Berkeley 🇺🇸 📊	10.9	96
7	▶ University of Washington 🇺🇸 📊	10.8	81
8	▶ Massachusetts Institute of Technology 🇺🇸 📊	10.6	93
9	▶ Cornell University 🇺🇸 📊	10.2	92
10	▶ Stanford University 🇺🇸 📊	10.1	67
11	▶ University of Maryland - College Park 🇺🇸 📊	9.6	90
12	▶ Northeastern University 🇺🇸 📊	8.3	88
13	▶ Purdue University 🇺🇸 📊	7.8	74
14	▶ University of Texas at Austin 🇺🇸 📊	7.5	50
15	▶ University of Pennsylvania 🇺🇸 📊	7.2	74
16	▶ Columbia University 🇺🇸 📊	7.1	61
17	▶ University of Wisconsin - Madison 🇺🇸 📊	7.0	70
18	▶ Princeton University 🇺🇸 📊	6.9	63
19	▶ New York University 🇺🇸 📊	6.5	75
20	▶ University of Southern California 🇺🇸 📊	6.3	67
21	▶ Univ. of California - Los Angeles 🇺🇸 📊	6.1	46
22	▶ University of Chicago 🇺🇸 📊	6.0	53

[rates schools](#) based on all checked areas using publications

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computer science open rankings
updated in 2024

Rankings are an ideology. Each is biased in its own way. So choose and combine existing rankings to generate your preferred meta ranking for computer science programs in the United States and Canada. Ranking sources represent: reputation (U.S. News*), faculty publications (csrankings.org*), academic placement (placement rank), and recognition (best paper awards). Use this to find the best computer science program for you in artificial intelligence, systems, or theory.

by Alice Marbach, Jeff Huang, Long Do, Shaun Wallace, and others who contributed the original ranking sources.

ranking source

- ☑ **U.S. News**   +
- ☑ **csrankings.org**   +
- ☑ **placement rank**   +
- ☑ **best paper awards**   +

☑ artificial intelligence

- ☑ computer vision
- ☑ artificial intelligence
- ☑ information retrieval & the web
- ☑ machine learning & data mining
- ☑ natural language processing

☑ theory

- ☑ algorithms
- ☑ cryptography
- ☑ logic & verification

☑ systems

- ☑ computer architecture
- ☑ networking
- ☑ performance analysis
- ☑ mobile computing
- ☑ databases
- ☑ operating systems
- ☑ programming languages
- ☑ real-time & embedded systems
- ☑ parallel computing
- ☑ computer security
- ☑ software engineering

☑ interdisciplinary areas

- ☑ bioinformatics & computational biology
- ☑ human-computer interaction
- ☑ economics
- ☑ computer graphics
- ☑ robotics
- ☑ information visualization

Select All   Deselect All

Showing only USA Universities ⌄

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CISE Broader Impacts:
An NSF Perspective

- Innovations in teaching and training;

- Contributions to the science of learning;

- Development and/or refinement of research tools;

- Computation methodologies and algorithms for problem-solving;

- Development of databases to support research and education;

- Participation in international research collaborations;

- Participation in national or international standards development efforts; and

- Service to the broader scientific and engineering community

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Other Activity and Impact Indicators

- Awards and recognitions, e.g., Best paper and ACM SIG awards, ACM/IEEE, Industrial Fellowships, Endowed/Named Professorships

- Service on editorial boards or program committees for high impact venues

- Active external funding (e.g., NSF, DOE, Industry)

Small Group Breakout: Help Alice and Bob!

Alice is interested in secure software systems

- Identify 3 programs in the Midwest
- In each program, identify two possible advisers with primary research in security and software engineering

Bob is interested in NLP

- Identify 3 programs that have at least 4 faculty in NLP and are not CMU, MIT, UW, Stanford, or UC Berkeley
- In each program, identify two possible advisers with primary research in NLP

Your Breakout Group name will indicate Alice (A) or Bob (B)
If your group really wants to switch, you can do so

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The PhD
Admissions Process

Typical Admission Processes

❖ **Undergraduates** admitted by School's Admissions Office

❖ **Graduate students** admitted by program/department (Graduate School oversight)

❖ **Departmental Graduate Admissions Committee**

➢ Committee compiles and reviews applicant portfolios

➢ Asks areas and faculty to provide further evaluation

➢ Faculty often champion strong students in their areas
  ■ Faculty may conduct remote or in-person interviews
  ■ Most departments invite applicants to visit after making decisions

❖ Admitted applicant decisions typically expected by April 15th

Common Applicant Review Procedures

Individual faculty selectively review applications
- Who reviews often depends on who has space in lab and has funding
- Faculty look at applicants interested in their research area
  - Good match with my needs?
- Possibility that few faculty look at a given application
- Higher supply of applicants in an area means faculty can be more selective
  - They will expect more experience/knowledge of an applicant
- If multiple faculty are interested in an applicant, they may coordinate interviews/outreach to applicant

Program admits an applicant if all the following are true
- Applicant has the potential to succeed in the program
- A faculty member wants to work with them
- Funding available: RA (through adviser), TA, fellowship

Admissions Process Demands: An Example

University of Washington, Computer Science

- Per applicant materials to review:
  - Transcripts
  - 3 Recommendation letters
  - Résumé or CV
  - Personal statement

- 2023 Statistics:
  - 3,000 applications
  - 150 offers
  - Expectation of 50-60 enrollees

CS Rankings: 8
US News: 5
CS Open Rankings: 6

https://www.cs.washington.edu/academics/phd/admissions/faq#chances

Admissions Process Demands: An Example

Duke University, Computer Science
- Per applicant materials to review:
  - Transcripts
  - 3 Recommendation letters
  - Résumé or CV
  - Statement of Purpose
  - Life Experiences Statement
  - GRE scores

- 2023 Statistics:
  - 545 applications
  - 87 offers
  - Expectation of 15-30 enrollees

CS Rankings: 27
US News: 21
CS Open Rankings: 37

https://gradschool.duke.edu/about/statistics/computer-science-phd-admissions-and-enrollment-statistics/

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How many Applications to Submit?

❖ Acceptance depends on many factors, including
  ➢ **Capacity**
    ■ program's faculty and funding capacity for new students
  ➢ **Overall strength of your application**
    ■ uniqueness of your background
    ■ your research record/potential
  ➢ **Competition**
    ■ number of competitive applicants (in the particular area)
    ■ popularity of your target research area (e.g., 60% of applicants interested in ML/AI)
  ➢ **Serendipity**
    ■ who reads your application

How many Applications to Submit? (cont'd)

- **Top applicants do <u>not</u> always get an admission**
  - acceptance rates are generally not public
  - for domestic students, expect
    - single digits for top 10 programs
    - about 20-25% for next 10
    - then about 30%+

- **Apply to 8-12 programs as a minimum**
  - maybe fewer if you already have the support of a faculty member

How many Applications to Submit? (cont'd)

- Discuss number of programs with your coach (area adviser, if you have one)
- General recommendation:
  - 3-4 "Very Good" chance programs
  - 3-4 "Good" chance programs
  - 3-4 "Reach" programs
- Programs have an application fee
  - CSGrad4US will cover up to $750 of your application fees
  - fee waiver exists (apply early)

Our advice

Communicate with your coach

- If there seems to be a lack of communication, let us know

- Ask at least two experienced people about your school choices

Broaden research interests
- Be broader research-wise and apply to more programs

Minimize geographical constraints

- Take a broader view and apply to schools that could be possible

Our advice

Applying to programs rated as highly selective

- Understand which programs are highly selective in what areas.
- Ask. Don't assume.

Interested in AI, ML, quantum?

- Understand that there is more competition.
- Have the best application material possible.
- Few departments have a strong presence in quantum.
- For AI, apply to 12+ programs (including reach-comfort-save)

Pay attention to faculty in multiple departments

- It can be confusing. In case of doubt, ask.
- Being listed under faculty may not mean access to admission files

Contacting Potential Advisors

Very common: Applicants are accepted if a faculty commits to advise

When to reach out?

- Before applying? After submitting your application?
- What does their webpage say about being contacted?
- If you make contact:
  - Are you familiar with their recent research activities? Have you reviewed samples of their work? What related work might you like to do?
  - Send an email (include your CV) and (briefly) introduce yourself
  - State that you have a fellowship (include a 1-pager about CSGrad4US)
  - Talk to your coach on what to highlight in the email

We will say more about this topic in an Session 4

Questions?

Next Week ...

Panel 1:

What I Wish I Would Have Known Before Applying (advanced PhD students share their experiences)
Tuesday, October 1, 2024 @ 7PM EST

Panel sessions do not get recorded (requested from panelists)