

## Scholarship Skills

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Research-Proficiency Exam and Theses

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## Research Proficiency Exam

- Probably the first time you will be treated as scientific peer by the faculty.
- The RPE is a Ph.D. candidacy exam.
  - At OGI the written qualifying exam was abandoned years ago, but the faculty held onto the RPE.  
Idea is that successfully doing research is the best predictor of the ability to do research.
  - At PSU the RPE was established more recently.  
Plays the role of the graduate school's "comprehensive exam"
- A pass on the RPE indicates that the faculty has confidence the student can complete a Ph.D.  
It's not "automatic"



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## RPE Paper

Takes the form of a conference or workshop paper in your area.

- See material on conference papers.
- You will need to understand the standards for content and organization of papers in your area. (Look at examples!)
- Evaluation committee will have technical expertise, though entire faculty gets the paper, so you might need a bit more background than if you were actually submitting to a conference.

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## RPE Paper and Presentation

What I am looking for:

1. Evidence the student understands prior work in an area.
2. Identification of an open problem — perhaps not the student's problem choice, but evidence that the student can articulate the motivation for the choice.
3. A feasible plan for solving the problem, and preliminary results.
4. Accurate assessment of what's been accomplished and what is missing. How the preliminary research sets the stage for a contribution.
5. Writing and presentation quality that convinces me you can write and present a dissertation.

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## RPE Presentation

Technical talk: 45 minutes, plus 15 minutes for questions

- motivates the problem
- describes related work
- research contributions.

Considerations

- Be audible and understandable.
- Be accessible to a general CS audience.
- Handle questions well.
- Fit within the allowed time period.

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## The Doctoral Dissertation

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## Ph.D. Dissertation

- In many ways like a book  
sometimes turns into one (ACM series).
- Advances and defends a *Thesis*.
- Authorship: single author, even when reporting joint work, but acknowledge others' contributions.
- A strong requirement for an original, substantial contribution.
- Complete:
  - may be quite long
  - space for motivation
  - self-contained (may have material in appendices).

## Scientific vs. Engineering Dissertation

- *Scientific dissertation* establishes new knowledge about some aspect of the world, obtained via theoretical derivation, experimental observation or computation.
- *Engineering dissertation* explains a substantially better way to construct some artifact or perform a process. “Here’s a new way to build an X, and here’s why it’s better.”
- May have elements of both.

## Ph.D. Process at PSU

1. Work with a research advisor to find a topic and do preliminary work, RPE
2. Do more work, publish papers.
3. Put together a Dissertation committee (Form GO16D)
  - Chair
  - Representative from office of graduate studies (must be from a different department)
  - 2 other members (1 can be external)
4. When scope of dissertation is getting clear, produce a dissertation proposal.  
Serves as an agreement on what will constitute an adequate dissertation.
5. Schedule and present the proposal to the committee. Not required to be public, but generally is in CS

## Ph.D. process (continued)

6. When committee is happy with proposal, they recommend “advancement to candidacy”.
7. Write dissertation.
8. Hold a dissertation defense (must be more than 4 months after advancement to candidacy).
9. Committee may ask for revisions
10. Final document must meet graduate school guidelines <https://www.pdx.edu/oqs/electronic-thesis-and-dissertation-etd-formatting-requirements>
11. Maximum of 5 years from advancement to finish.

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## Another Take on the PhD

- MS means you understand the state of the art.
- PhD means you're capable of advancing the state of the art.  
Estelle M. Phillips and D. S. Pugh. *How to Get a PhD*, 2nd Ed. Open University Press, 1994. ISBN 0-335-19214-9.
- Purpose of a PhD is to demonstrate that you are a fully professional researcher.
  1. You have something to say that your peers want to listen to.
  2. You have enough command of your subject to evaluate what others are doing.

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## Professional Researcher, Cont.

3. You are astute enough to discover where to make successful contribution. (Not always true—learning to *pick* problems can take longer.)
4. You have mastery of appropriate techniques.
5. You are able to communicate your results in a professional arena.
6. You can do all this in an international context—your peer group is worldwide.

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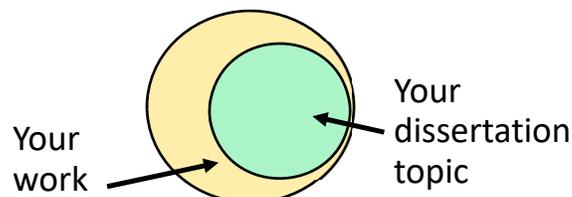
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## What's in a Dissertation?

- Should read some other dissertations (and attend some proposals and defenses)
- Key conceptual elements of a thesis
  - Background theory: related work with evaluation
  - Focal theory: what you research and why the “thesis”
  - Data theory: justification for material you will use. Why is this the right evidence?
  - Contribution: evaluation of importance relative to the discipline—what's new, how's the world different?

## Scope

- Your dissertation is not the be-all and end-all of your research career (or even of your work in graduate school).
- You must make a substantial contribution, but don't need to solve everything.
- Not all of your research has to be related to your dissertation.



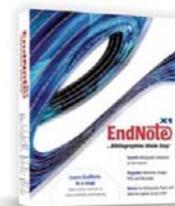
## Communication

- Talk about your research every chance you get
  - At conferences, workshops, student research competitions.
  - With your advisor and your research group
  - Fellow students are often willing victims, if you reciprocate
- Keep writing!
  - Not just as part of formal writing commitments
  - Best way to clarify and document your thinking
  - Many opportunities for re-use

## Tools

- Learn how to use the best tools for the task at hand properly
  - Writing papers
  - Maintaining bibliographies
  - Drawing graphs and diagrams
  - Writing code
- This is a multi-year effort, so the time investment will pay off
- Also applicable for background knowledge and skills — a basic understanding of statistics, for example, is important for any kind of quantitative research

BIBTEX



## Bibliographies

- Keep your bibliography current as your research progresses
- Note why each item is relevant to you
- Keep a copy (paper or electronic) around!

```
@misc{Chatterjee01,  
author = "Satrajit Chatterjee and Sailesh Krishnamurthy",  
title = "{Risque: Recovery in Internet Scale Queries}",  
year = "2001",  
note = "Accessed on February 2005 from  
  \url{http://www.cs.berkeley.edu/~sailesh/cs294-4/index.html}",  
notes = { Project report. The web page went away!}  
}
```

## Planning and Time Management

- A significant part of your time (some say up to 10%) should go to planning
- Have a rough idea of where your time goes, and of how far along you are in each of your projects
- If you do not have more project ideas than time to work on them, you are doing something wrong!

## Decomposing the Work

*The secret of getting ahead is getting started. The secret of getting started is breaking your complex overwhelming tasks into small, manageable tasks, and then starting on the first one.*

Mark Twain

