

Gerhard's Advice for PhD Students

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The Larger Context

Get Other Things out of the Way

- course work
- preliminary exam

Advantages of Integration with a larger Research Activity/Project:

- association with research projects → this will help you to provide an initial framing of your own research
- it will provide you with an environment in which you as a member of a team can achieve more than an individual
- it provides ideas/ components on which you can build (remember Herbert Simon: “complex systems develop faster if they can develop on stable subsystems”)
- it provides you with fellow students with whom you should interact (trying to explain your ideas to someone else is an important exercise) → build social capital (i.e., find the right mixture between “give and take”)
- it represents an environment in which “learning to be” is an essential aspect

Which Role does your primary advisor play:

- it is **your** thesis – not the thesis of your advisor(s)
- your advisor will try to serve as a critic for your work – providing help in
 - articulating the problem
 - integrating the problem into a larger context
 - directing you to interesting literature
 - challenging your ideas

- your advisor will not be willing (because she/he does not have the time) to read arbitrary many drafts of >40 page documents — therefore you should use your judgment for finding the most productive points in time to give her/him a draft of your work
- engage in a symmetric relationship
 - you expect that your advisor is interested in what you have to say
 - this is more likely if you are interested what she/he has to say

Which Role does your Committee play:

- think about your committee early, because the more they are involved, the more they can help you shape a question, and the more you can benefit from their perspective
- your advisor is the primary person — and she/he should be willing to spend extensive time with you and constructively criticize your ideas and system building efforts
- this is not quite true for the other committee members → create short versions of your documents (e.g.: proposal and final documents) which can serve to communicate with the people on your committee effectively

The Ph.D. Thesis

The overall picture

-----X-----X----->

Proposal	Thesis	
understand and define your problem	* work on the problem * co-evolution between specification and implementation	be happy and become rich and famous

Ph.D. Proposal — the most important parts

1. an important question about timing: **when to do a thesis proposal?** → find the balance between not knowing enough and doing too much work beforehand (discuss the timing with your advisor/committee)
2. give at least one presentation at a research meeting with your “friends” discussing your work the semester before you think you will propose → this will help you
 - 2.1. find out what is easy and hard to understand
 - 2.2. see the difficulties that other people perceive
 - 2.3. draw connections to other people's work
 - 2.4. obtain practice in answering hard questions
3. look at samples of proposals from the “giants” who did it before you
4. clearly articulate to objective of the work which you plan to do for your thesis
5. articulate hypotheses, questions, assumptions and define criteria for assessment
6. have an initial “prototype” of your work done (theoretical framework, system building efforts)
7. the most important achievement by this time might be that you have “narrowed down your topic enough” that it is doable in a reasonable time frame (e.g., in 12-18 months following the proposal)
8. parts:
 - 8.1. say what **YOU** want to do

- 8.2. articulate the problem(s) **YOU** want to solve
- 8.3. articulate the existing theories/systems **YOU** want to challenge
- 8.4. describe the problem domain
- 8.5. outline the extensions to the theories you will come up with
- 8.6. outline the systems to be built – illustrate them with scenarios
- 8.7. describe the empirical studies to be done
- 8.8. predict the results achieved by the time you will be done
- 8.9. provide the rationale for all your decisions

Ph.D. Final – the most important parts

1. look at samples from the “giants” who did it before you (see course meeting on November 8, 2006)
2. a concise, clear statement
 - 2.1. of the core problem tackled by your Ph.D. work
 - 2.2. a summary what you have achieved
3. all the “regular” sections (look at samples) plus additional sections including
 - 3.1. glossary
 - 3.2. index
4. doing references (and doing them right) is a lot of work → it gets greatly simplified if you take advantage of the Library system (e.g., Endnote) which you may develop collaboratively with your co-workers

During the Whole Process:

1. participate in writing papers
2. participate in writing research proposals
3. apply for doctoral consortia at major conference
4. show your work to visitors and get their feedback → important because: “being a PhD student means to become a member of a community” (“legitimate peripheral participation” as an important learning principle)
5. take advantage of opportunities provided by CU, such as: CS departmental colloquia, ICS, ATLAS,
6. engage occasionally in discussion about your work with people who do not share your world view (interdisciplinary and transdisciplinary collaboration)
7. volunteer to do tasks which need to be done by the community

What does a Ph.D. require

1. intrinsic motivation
2. dedication
3. sometimes: hard work
4. getting through days in which one thinks:
 - 4.1. “I will never get done with this!”
 - 4.2. “why do I waste years of my life doing this!”

What is a Ph.D. all about:

1. it qualifies **you** for the rest of your life
2. it opens **you** doors which may provide unique opportunities for you
3. it should motivate you *“to work hard not because you have to – but because you want to!”*