

Graduate School Tips

CPS 300: Introduction to Graduate Study

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Assignment

Due in 4 weeks, on December 1

- Talk to your potential advisor or a senior student
 - Get recommendation of a recent and/or important paper in an area/project that interests you
 - Get a sense of the important publication venues in this field
 - Get recommendation on document editing, reference management, and literature search tools
- Read the suggested paper
- Find a few (between 2 and 5) related papers; skim them
- Prepare a BibTeX file of all above papers
- Prepare a short document (≤ 2 pages)
 - Summarize (in your own words) the paper you read
 - Write a few sentences about each related paper

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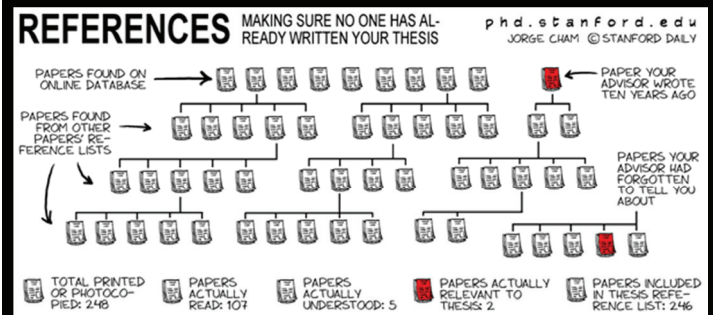
Tools of the trade

	My current choices
Document editing	LaTeX + Emacs + make Occasionally Word 2010
Reference management	BibTeX + Emacs + make
Presentation software	PowerPoint 2010, or with TeXPoint
Web authoring	Emacs + XML + scripts Wiki + XML + scripts
Graphing	Gnuplot, Matlab
Drawing	Xfig with LaTeX PowerPoint 2010 + PDF/EPS export

Again, the "Resources" panel of the course website has many useful pointers

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On finding related work



<http://www.phdcomics.com/comics/archive.php?comicid=286>

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On finding related work (really!)

- Ask your advisor, who can offer good starting points and see not-so-obvious connections
- Follow citations (forward & backward)
- Google (Scholar) + online databases (e.g., ACM DL, DBLP)
 - Need to build up a list of useful keywords
- Rank using citations/venue prestige
- Routinely check top venues
- Share with fellow students (reading groups, journal clubs)
- Talk to people at seminars, conferences, ...
- Talk to those outside your field
 - Start with your fellow grad students!

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Deciphering academese

"To the best of the author's knowledge..."	= "WE WERE TOO LAZY TO DO A REAL LITERATURE SEARCH."	"It should be noted that..."	= "OK, SO MY EXPERIMENTS WEREN'T PERFECT. ARE YOU HAPPY NOW??"
"Results were found through direct experimentation."	= "WE PLAYED AROUND WITH IT UNTIL IT WORKED."	"These results suggest that..."	= "IF WE TAKE A HUGE LEAP IN REASONING, WE CAN GET MORE MILEAGE OUT OF OUR DATA..."
"The data agreed quite well with the predicted model."	= "IF YOU TURN THE PAGE UPSIDE DOWN AND SQUINT, IT DOESN'T LOOK TOO DIFFERENT."	"Future work will focus on..."	= "YES, WE KNOW THERE IS A BIG FLAW, BUT WE PROMISE WE'LL GET TO IT SOMEDAY."
		"...remains an open question."	= "WE HAVE NO CLUE EITHER."

<http://www.phdcomics.com/comics/archive.php?comicid=405>

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How to read a paper

Above all, question authority

- Identify the problem being solved
- Attack the problem yourself, without looking at solutions
 - At least come up with their “strawman” solution
 - Might even get a better solution!
- Read their solution and compare it with yours
 - Are you convinced which one is better?
- Write a short, poignant summary; record in your bib db
 - Don't just copy their abstract
 - Keep additional notes in your bib db when you revisit the paper or discuss it with others

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On reading motivation

- Is the problem **new**?
- Is the problem **important**?
- Is the problem **interesting**?
- Is the problem **contrived**?



- Learn how people make good/bad pitches
 - Some papers overstate/understate their applicability
 - Can you do better?
- Come back after finishing reading: **did they solve the same problem motivated earlier?**

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http://www.ludumdare.com/compo/wp-content/uploads/2008/12/no_motivation.jpg

On reading evaluation

- **Do the experiments tell you anything new?**
 - Many simply confirm the obvious!
 - E.g., # of ops counted analytically vs. measured
 - How do you make it more interesting?
- **Is the paper trying to hide something?**
 - Unexplained “magic sauce”
 - E.g., how to tune a parameter
 - Choices of workloads and parameter ranges
 - E.g., synthetic datasets, unreal uses of real datasets, or x -axis covering a small range
 - Choices of performance metrics
 - E.g., an index costs 1/10 of the I/Os incurred by a full scan—great?



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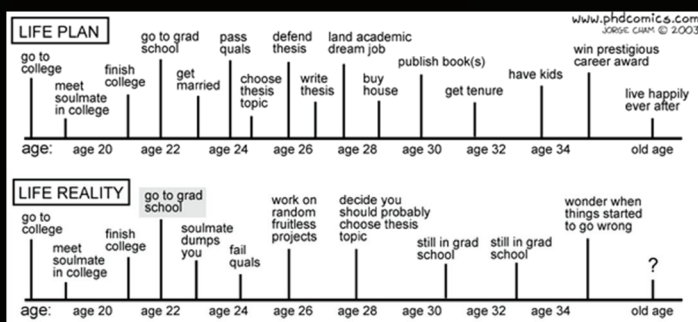
<http://www.pjcn.net/yapc/yapc-eu-2007-gluing-a-bank-together/slides/images/investigate.jpg>

Other reading tips

- Read related work carefully
 - A glimpse at the bigger picture and pointers to follow to learn more about the problem/area
 - Think beyond their related work discussion
 - Congrats if you uncover non-obvious connections to other areas!
- After you finish reading
 - What is the “take-away” message?
 - Think about future work
 - What assumptions can be relaxed or introduced?
 - Learn to appreciate their contributions
- Don't judge what a paper is about by its abstract
 - Corollary: if you cite it, better read beyond the first page!

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Importance of planning



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<http://www.phdcomics.com/comics/archive.php?comicid=360>

A fictional PhD student: Year 1

- Took many courses and aced them, like he always did
- Courses/TA took most of the time, but he was taking care of quals (and without exams!)—so no time was wasted?
- Met with a couple of professors, got papers to read, showed up in group meetings, but didn't have time to “do” much
- Thought he could declare Prof. A as advisor at the end of Semester 2, but Prof. A wouldn't commit
 - Got placed on departmental probation
 - Cursed the other student whom Prof. A did take
- Couldn't take advantage of the RIP initiative
 - So what? Got a well-paid programming job in the summer

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A fictional PhD student: Year 2

- Thank God Prof. *B* took him!
- Late RIP proposal was rushed and half-baked; committee wanted an extra progress report!
- After the progress milestone, Prof. *B* didn't think the defense would be ready until summer
 - Told by Prof. *B* to "prove himself" in the summer or else he would get no funding next year!
- Spent the summer finishing RIP while watching other 2nd-years getting cool internships at research labs or working on their prelim

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A fictional PhD student: Year $n \geq 3$

- Had to do more work in Semester 5 to turn RIP results into a submission
- Realized the approaching prelim deadline, but still had no topic
 - Thank God the Grad School extended deadline to Semester 7
- Requested extension again because Prof. *B* didn't think prelim was ready
 - No *Saved by the Bell* in grad school
 - Pass by the end of Year 4 or withdraw



<http://www.cartoonstock.com/newscartoons/cartoonists/tzu/lowres/tzun11021.jpg>

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A fictional MS student: Year 1

Semester 1

- Enjoyed life: 8+2 courses in 2 years = a piece of cake?

Semester 2

- So far, 4 regular courses: good progress?
- What? Declare an advisor?
 - Thank God Prof. *C* took him!

Summer 1

- Enjoyed life: travel + internship
- Prof. *C* was traveling too anyway!

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A fictional MS student: Year 2

Semester 3

- What? Job hunting now?
- Still needed time to warm up to research
 - Why did Prof. *C* give another MS student RA support?

Semester 4

- Kept busy by courses and interviews, but really needed more time for research
- Prof. *C* thought the project wasn't ready for defense!

Summer 2 and beyond

- Had to stay to wrap up MS project and defense
 - Continued to pay Duke \$\$\$ while watching classmates graduating and moving on

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Team discussion (20 min.)

- Knowing what went wrong for these fictional characters, how would you plan your own PhD/MS career?



http://pattersonenterprisesltd.com/upload/HomePageBlocks/CareerPlanning_0000u456450XSmall.jpg

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Team assignment

- Team **Young Scientists**
 - Yunjia, Wuzhou, Marisabel, Xuan, Zihang
- Team **Couch Potatoes**
 - Fan, Jannie, Janardhan, Yu, Rohit
- Team **Good Looking**
 - Bing, Alan, Yezhou, Muzhi, Botong
- Team **Amazing Five**
 - Ke, Prateek, Muhammad, Tianqi, Xiao
- Team **Enigma**
 - Bala, Fei, Yasunori, Xiaoming, Dina
- Team **Rawxs**
 - Alex, You, Salman, Xixi, Rozemary

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A reasonable PhD schedule

Year 1

- Talk to faculty, attend seminars and group meetings this fall
- Declare **advisor** early in spring
- Form **committee** and do **RIP proposal** before summer
- Earn 3 (or least 2) quals credits
- Focus on courses in your area (or related areas) and do projects that impress your potential advisors
- TA in spring

Summer 1

- Whatever you do, stay in touch with your advisor
- You may be offered an RA:
 - **RIP initiative** makes it easier for advisors to fund you
 - Take it—at this stage it's often better than a higher-paid coding job

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PhD schedule: Year 2

Year 2

- Full speed ahead with your research
 - Goal: a publishable piece of work for **RIP**
- Pass the **remaining quals**
- Focus on courses useful to your research
 - Follow your advisor's advice; no need to meet all course requirements yet
- TA in fall or spring; may even be deferred or waived
- Confirm future funding arrangement with your advisor

Summer 2

- Continue working with your advisor, to get a head start on prelim
- Or, find an internship relevant to your research
 - Use your advisor's connection

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PhD schedule: Year 3

Year 3

- In fall, decide on your dissertation direction
 - Check with your advisor for classes to take before prelim
- Obtain initial results, and publish more on the way
- Get your committee together by early spring, and write/defend your **prelim**
 - Part of it is a dissertation proposal: not a contract, but a demonstration that you are "ready," e.g., able to propose a research agenda suitable for PhD
 - Check with your committee for scope and expectation
 - Extensions must be approval by the Graduate School
 - Extensions beyond Year 3.5 are rarely granted

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PhD schedule: Year $n \geq 4$

Years 4 to $n - 1$

- Research, research, research...
- Wrap up course requirement; you can always take/audit more to expand your horizon and stay up-to-date

Year n

- Your last spring will be packed by interviews, writing, and defense
 - Job hunting starts earlier and takes more time than you think
 - For academic jobs, applications start in late fall
- Get bulk of your work done before last fall!

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A reasonable MS schedule: Year 1

Year 1

- Finish >50% (i.e., ≥ 5) of the **regular courses** required
- Do projects that can impress your potential advisors
- Talk to faculty, attend seminars/group meetings this fall
- Declare **advisor** in spring
- If you don't start your **MS project** in spring, at least develop a concrete idea and some steps to take in the summer
- Don't miss any career fairs

Summer 1

- Whatever you do, stay in touch with your advisor, and continue/begin working on your MS project

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MS schedule: Year 2

Year 2

- Finish the rest of the **course requirement**
- Form your **committee** in fall and **defend** in spring
- Get bulk of your research work done before last fall, because your last spring will be packed by interviews, writing, and defense
 - Job hunting starts early and takes a lot of time
 - Don't miss on-campus opportunities

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