PhD Studies:
So... What do I need to do?

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What's the goal of PhD studies?

Australian PhD... so not so bad ☺
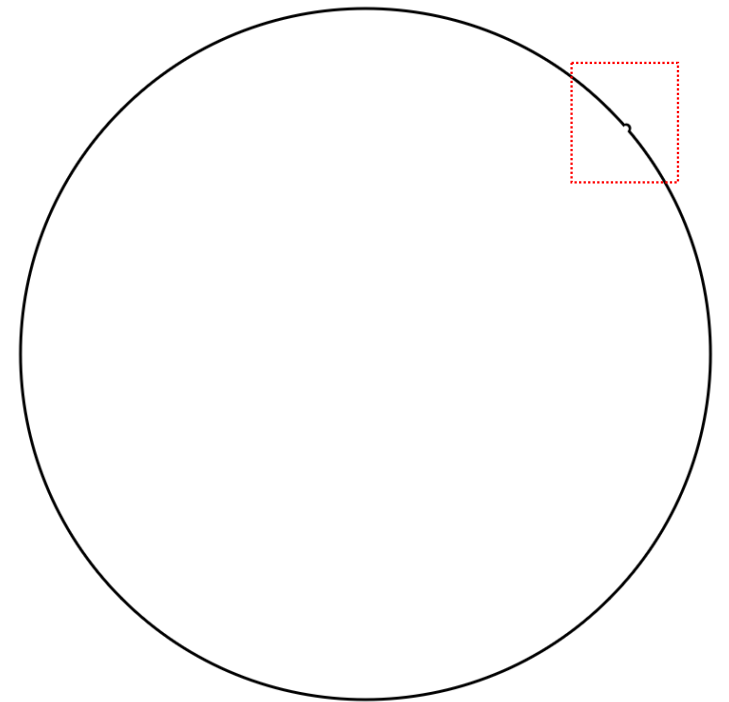
What's the goal of PhD studies?

- To get the PhD degree
- Learn skills/knowledge
  - Finding a research topic + critical & deep thinking + the skills and knowledge in your chosen research area
  - Paper reading
  - Writing
  - Giving a (technical) talk
- Have a good portfolio to get the next job (ie, paper/code)
- Keep your health & family

How to get the PhD degree?

- Make novel contributions in your chosen field
- But, not your life work! (https://matt.might.net/articles/phd-school-in-pictures/)

David Patterson How to have a bad career in Research
https://people.eecs.berkeley.edu/~pattrsn/talks/BadCareer.pdf

How to get the PhD degree? Cont.

- Ask your supervisor what their requirements are

- Generally, their answer would relate to the portfolio for your next job

- But, to achieve that, you would generally need to learn
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Finding a research topic + critical & deep thinking + the skills and knowledge in your chosen research area

- Ask your supervisor ☺

- Finding a topic:
  - It's useful to do a literature review, though not a reason to not start your work or "get your hands dirty"
  - Richard Hamming, "You and Your Research"

    (https://www.cs.virginia.edu/~robins/YouAndYourResearch.html)

Finding a research topic + critical & deep thinking + the skills and knowledge in your chosen research area

- Critical & deep thinking
  - Technical discussion with your supervisor & colleagues
  - Ask the "so what" and "what if" questions

Picture taken from https://phdcomics.com/comics/archive.php?comicid=1554

Quite different from coursework program

- Most here have done very well in their undergrad/master

Coursework program	PhD
Very structured: - 4 years divided into semesters - Each semester, take k courses - Each course has assessments - Each assessment has a deadline	Seemingly unstructured: 4 years to write 1 thesis **Can be made a bit more structured:** **Talk to your supervisor**

Many do research because it's fun, but…

- Some part of research is tedious, annoying, and perhaps frustrating but necessary
  - Every job and almost everything in life have their positive and negative
  - So, just do and bear with it

Paper reading

- A paper is ***random access***
- Skim to try to understand the high-level idea first
- If it's interesting, read again to figure out the details
- Ask:
  - What's different from other work?
  - Why do they do things that way?
  - What's the assumptions? What if ...?
- Make notes
- Keep a bibliography + notes

Writing

- Try to write an outline (chapters – sections – paragraphs)
- Each paragraph has 1 point to convey
  - Ideally, put them in the 1st or last sentence
- Don't forget to define terminologies and notations!
- As much as possible, keep it simple
  - Mathematical equations should help to be more precise, not to add complexity
  - When we do need to write many equations, provide some intuition
- Have someone else read the draft! Revise!

The what: Strunk & White. Elements of Style. ;
The how: Williams & Colomb. Lessons in Clarity & Grace.

Giving a (Technical) Talk

- A presentation is **NOT** random access
  - As much as possible, tell the "story" linearly
  - For longer talk > 15 min: Provide a high-level view (outline) & remind people
- Often, less is more!
- Know how fast you talk, and use them to estimate #slides for a given talk slot
  - In general, 1-2 min per slide
- Use illustration, but make them meaningful and keep them simple & clear
- Rehearse!

Patrick Winston How To Speak: https://www.youtube.com/watch?v=Unzc731iCUY ;
Bruce Donald: https://users.cs.duke.edu/~brd/Teaching/Giving-a-talk/giving-a-talk.html ;
David Patterson: https://people.eecs.berkeley.edu/~pattrsn/talks/BadTalk.pdf ;
Terence Sim Super Speaking slides at https://tsim17.wixsite.com/terencesim ;

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Portfolio for the next job

- Paper and codes

- Networking
    - Visitors
    - Visiting other labs
    - Other PhD students
    - Conference

- Internship
    - Internship vs graduate sooner: Take the internship!

- But so, what's after PhD?

Many pathways …

- Academia?
    - Faculty (research + teaching)
    - Research focus
    - Teaching focus
- Industry?
    - Join a company? What type? Join R&D of the company or …?
    - Start your own company?
- Research organisation?
    - What type? Government lab? Companies research lab?
- Not working on research
- Combinations of subsets of the above and beyond

Regardless of the path taken, to progress, need to … Know what you want (desired career/life)

- Often, not exactly but just a rough idea…

- Not doing anything before knowing what you want exactly is generally not a good idea…
  - We can know better what we really want after trying
  - The field moves fast

- But, not thinking what you want and going with the flow all the time is also not always a good idea…
  - Going with the flow means everyone else are also doing it → fierce competition
  - The flow changes often, but many advances require some sort (actually, a lot) of tenacity

To help know what you want...

- Know what you like, your strength & weaknesses:
  - Affect what you want and how to get them

- Know what skills/characteristics are required for your desired career
  - What if the required skills/characteristics happen to be your weaknesses?
    That's okay! It'll give you a chance to think!
    - What exactly is needed?
    - What to improve & what's the effort required? Do you think what you want is worth the effort?

- ***During your PhD, research should be your #1 priority***
  - ***This is true regardless of your chosen career path after PhD***

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Keep your health & family

- Life has a time dimension
  - Work-life balance should account for time too

- Good reading: Randy Pausch, The Last Lecture
  https://www.cmu.edu/randyslecture/

Picture taken from https://jasongoroncy.com/2009/02/19/pastoral-ministry-enter-at-risk/stress-11/

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Thank you -- Q&A