

INTRODUCTION TO RESEARCH METHODOLOGY

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DO YOU REALLY WANT A GRADUATE DEGREE ?

- ◉ Are you ...
- ◉ Waiting for a new job
- ◉ Have nothing to do
- ◉ Forced by surrounding people
 - Most of my friends got at least a Master degree
 - Forced by parents or family
- ◉ Want to make more money
- ◉ Or do you want to ...
- ◉ Learn and involve in depth of a specific area
 - By self-interest, job required
- ◉ Want an opportunity to create something cool / new stuff
- ◉ Be a researcher

CAREER OPTIONS FOR RESEARCH

- ◉ Grad student
- ◉ Post doctoral
- ◉ Faculty
 - University
- ◉ Research Institutes
 - NECTEC / BIOTECH / MTECH
- ◉ Industrial research job
 - Product development
 - R&D

YOU CANNOT TRY...

- ◉ Listen to your heart - Trust your instinct
- ◉ If you really need it, you will definitely make it
- ◉ Otherwise, you will not be able get it at all (no matter how long)

A GRADUATE LIFE

- ⦿ Graduate study is an **unstructured** way of learning
 - Very hard to know exactly what you are supposed to be learnt
 - Don't know how to start
 - Don't really know where is the end
- ⦿ For sure, you have to read **a lot**

MASTER DEGREE

- Take 6-8 courses (> 25 credits) + 12 credits for thesis
- The first semester
 - Course work
- The second semester
 - Course work
 - Start finding research topic
- The third semester
 - Proposal Exam
 - Course work
 - Working on experiment / simulation / testbed
 - Submit a conference / journal for publication
- The fourth semester
 - Writing a thesis
 - Present a paper in a conference

A little bit difficult

stressful period

PH.D. DEGREE

- ◎ Ph.D. Degree
 - 48 credits for dissertation
- ◎ The first year
 - Review coursework
 - Qualifying exams - Written Part
- ◎ The second year
 - Finding a research topic **very difficult and stressful period**
 - Qualifying exams - Oral Part (4-subject related to research)
 - Proposal exam
- ◎ The third year and more ...
 - Working on design
 - Experiment/ simulation/testbed
 - Submit a preliminary results for a conference/journal
 - Publish in journal (at least 6 months)
 - Writing a dissertation

PH.D. DEGREE

◎ Get involve with ...

- your advisor's teaching load (TA)

This will be very helpful for you once you become an instructor

- Taking care of master degree students

WHAT IS RESEARCH?

- ⊙ Research = ปัญญา ... พระธรรมปิฎก
- ⊙ Research = ค้นหา ค้นคว้า สืบค้น ตรวจสอบ และ พิสูจน์
- ⊙ Levels of research
 - Finding the truth
 - Finding a good thing, useful thing
 - Finding a new better way/ algorithm
 - Finding a way to make it possible/working

RESEARCH AWARENESS

- ◉ Interesting to you
- ◉ Interesting to your advisor
- ◉ Interesting to research community

From my understanding from a word of the Buddha ...

THERE ARE PLENTY OF LEAVES IN THE FOREST,
HOWEVER FOR THE SHORTEST PATH AND MOST
IMPORTANT, THE THING THAT YOU HAVE TO
KNOW IS LIKE A HANDFUL OF LEAVES

WHAT GRADUATE STUDENTS USUALLY DO?

- ◉ Majority of their time reading papers
- ◉ Discussing ideas with advisors and friends
- ◉ Be able to cope with criticism
- ◉ Carefully thinking and thinking
- ◉ Make connection between the real world and Theoretical (e.g. mathematical) world
- ◉ Writing a program on a simulator for proving the idea
- ◉ Implementing the idea
- ◉ Writing and revising papers

(MY) ENGINEERING JOURNALS

- Keeping a (paper) notebook called “engineering journal” handy to record ...
 - Things you have read
 - Your bright (or even non-sense) ideas
 - Research activities
 - Interesting problems
 - References to some source
 - your research activities and ideas is very useful
 - Outline a paper or thesis
- Read back through it periodically
- **“Don't plan to share your journal with anyone -- write freely”** by <http://gradschool.about.com/cs/thesiswriting/archjournal.htm>

THIS IS NORMAL

- ⦿ Encounter with a lot of new technical knowledge (from reading) until you get familiar
- ⦿ Spend lot of the time in the reading to keep update in your area
- ⦿ Ask your advisor or a fellow student
 - Book to start with
 - Papers that you should definitely read
 - Classical papers or surveys in your field

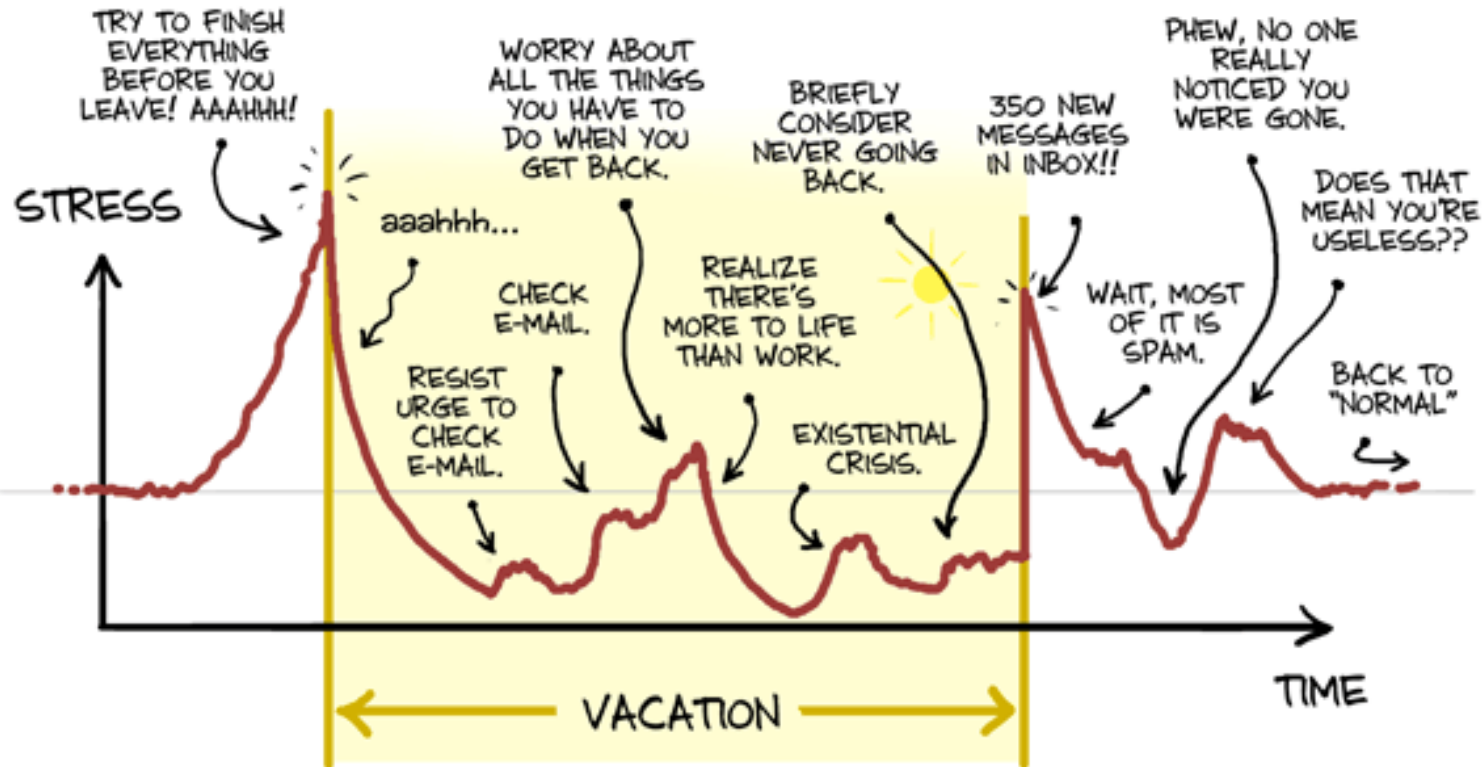
UNDERSTAND WHAT YOU READ

- ◉ Clearly identified the problem
- ◉ Understand the motivations for the problem
- ◉ How to solve the problem
- ◉ Assumptions for the particular solution
 - Realistic or not
- ◉ The validity of the theoretical or simulation part
- ◉ Future research
 - Extending, scaling, or speed up
- ◉ Systematically file what you read (e.g. BibTex)

STAY MOTIVATED

- ⦿ After a period of time (one or two years)
 - Dropped of interest
 - Feel lost
 - Have a negative attitude
- ⦿ To stay focused
 - Plan your daily life (hours of work)
 - Set a clear goal (weekly or monthly)
 - Regular meetings with your advisor
 - Attending seminars, conference, or guest speakers
 - Relax with exercise (sports)
 - Special entertaining activities (e.g. movie, music, find something special to eat)
 - Find a research buddy - chat, review progress

VACATION RELAXATION?



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HANDLE YOUR WORK

- ◉ Start working on a small project
- ◉ Breaking down (Divide-and-conquer) any task into smaller pieces
 - “Roam was not built in a day” ... John Heywood
 - “Thesis cannot be written in a week” ... Anan Phonphoem
 - Instead of writing an entire thesis/paper
 - Set an outline
 - Set a goal for writing up a chapter (section)

YOU ARE SO LUCKY IF YOU HAVE ...

- ◎ A good advisor

- Get advise
- Setting up directions and research goal

- ◎ Otherwise

- You will be strong by being independent
- Don't isolate yourself
 - Try to get support from other professors
 - Get connect with other graduate students

FINDING THE RIGHT ADVISOR

- ◉ Guarantee success in your graduate study
- ◉ How to know which one
 - Ask from current and previous students
 - Query about their relationship (including non-research)
 - Frequently meet or encouraging independence
 - Graduation rate
 - Drop-out (or changing advisor in the middle) rate

POTENTIAL ADVISORS

◎ Your potential advisor should

- In your research area
- Actively doing research (# publication)
- Involved in the research community (joining conference/ committee)
- Feel comfortable to speak with

◎ For a new faculty

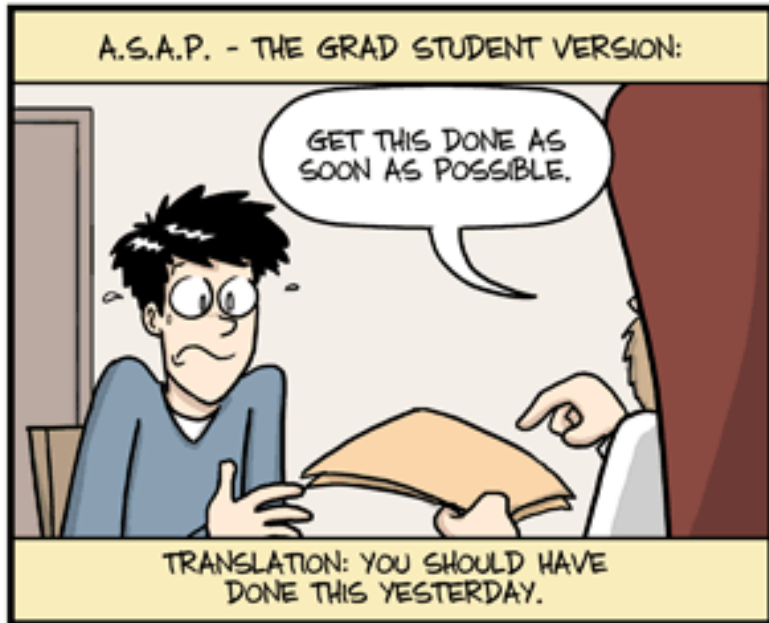
- Freedom to choose your research topic
- Friendly to discuss
- Be isolated (no elder grad students)
- Less experience for handle research and students

A GOOD ADVISOR

- “A good advisor will serve as a **mentor** as well as a **source of technical assistance**”
- A mentor should provide
 - Help you to find resources (financial or equipment)
 - Psychological support
 - Give **moral and ethical advises**
 - Introduce you and promote your work to important people in your field
 - Encourage your own interests, rather than promoting their own
 - Be available to give you advice on the direction of your thesis and your career
 - Help you to find a job when you finish
 - Help you to set and achieve long-term and short-term goals

GETTING TO KNOW HIM/HER

- ◉ Introduce yourself and describe the area you're interested in
- ◉ Ask for attend their research group meetings
- ◉ Ask for comment on what you want to work on
- ◉ Ask for TA or RA positions availability
- ◉ Regularly drop by (during office hours or good period) and ask questions/comment
- ◉ Offer help (small project / proof reading)



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ADVISE FROM ADVISOR

- Very different for each student
- Some students prefer
 - To be given more direction
 - Have frequently contact
 - Want advisor to checked up on
- However, some students prefer
 - Need independent
 - Need contact but be self-conscious (shy) about asking question
- Preferred feedback
 - Wide or directed ideas

CORE PRINCIPLES IN RESEARCH

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OCCAM'S RAZOR

"WHEN FACED WITH TWO POSSIBLE EXPLANATIONS, THE SIMPLER OF THE TWO IS THE ONE MOST LIKELY TO BE TRUE."



OCCAM'S PROFESSOR

"WHEN FACED WITH TWO POSSIBLE WAYS OF DOING SOMETHING, THE MORE COMPLICATED ONE IS THE ONE YOUR PROFESSOR WILL MOST LIKELY ASK YOU TO DO."

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Occam's razor (or Ockham's razor) ... from wikipedia
is the principle that "entities must not be multiplied beyond necessity" (*entia non sunt multiplicanda praeter necessitatem*).
The popular interpretation of this principle is that the simplest explanation is usually the correct one.

The principle is attributed to 14th-century English logician, theologian and Franciscan friar William of Ockham.

MY ADVISE ABOUT “ADVISOR”

- ⊙ Sources of information
- ⊙ Sources of research topics
- ⊙ “Be prepared !” to meet advisor
 - Not go with empty hands (mind)
 - Summarize what you have
- ⊙ Regularly meet him/her
 - Advisor (sometimes) does not bite
- ⊙ Do what he/she want first and *argue later* !
- ⊙ He/She is “The One” → *Faith*

UPSET WITH YOUR ADVISOR

- You may not always receive what you need
 - The most important thing is to ask for (i.e., **demand politely**) what you need.
- However,
 - Multiple mentors are common and useful
 - Other faculty members in your department or elsewhere
 - Senior graduate students
- Seriously consider **changing** thesis advisors if
 - Your advisor is inaccessible
 - Disinterested in the topic
 - Gives you only negative feedback
 - Doesn't have the technical background to advise you on your thesis
 - Harasses you

REFERENCES

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