**Week 1: 09/02/2024**

* Motivation: identify a need, challenge
* Ask why
* Explore avenues on how to solve the problem
* Be curious

What to find crossroads of your strength, potential impact, and passion

* Own strength
  + Motivations
  + What is easier for you
  + Try various projects/classes
* Find a passion
  + What do you enjoy
* Identify impact will this work hav**e**
  + What kind of impact will the work have
  + What will you become an expert in?

Matching with Advisor

* Mentor (research/career)
* Connect you to research community
* What makes for a good match
  + Research subfield
  + Flexibility
  + Working style
  + Agreeable funding situation

**Research Area to Identifying a good Research Topic**

* Apprentice
  + Advisor has lists of topics/funded projects that need to be worked on
  + Extended course project
  + A talk inspiration
    - Pay attention to the literature
      * Your idea may have already been done or may not work
  + Data needs answers
    - See that there is a question that needs answering
    - Warnings:
      * Do you have access to the data
      * Who gets to answer those questions
  + Flash of brilliance
  + Inspiration v. Perspiration
  + Interdisciplinary
    - Find a problem from a different field
  + Stapler
    - Work on multiple topics and publish papers about them
    - Pull together into a single dissertation

Tips and Suggestions

* Have open-mind

Topic Scope

* Deep enough to qualify as challenging?
* Too big that is too big to handle in timeframe of PhD?
* Is your problem solvable?
  + Tools/data/equipment
  + Have/can acquire skills
  + Metrics for success
  + What to compare against
* Is there a story to tell?
  + Noval
  + Exciting
  + New

When stuck

* Read/present papers regularly to find open research issues
  + Practice summarizing, synthesizing & comparing sets of papers
  + Create own slides
  + Don’t 100% believe what paper says
  + Get feedback and ideas from others: conference, research internships,
  + Be open to trial and error
* Internships
* PhD oral exams, defenses, faculty candidate talks
* Assess progress with advisor
* Change topics
* Change advisors
* Take few months breaks

Research Advisor

* Learning to do research => apprentice relationship
* Apprentice research
  + Identify problems worthy of MCS/MS/Ph.D
  + Tackle problems, design experiments
  + Craft arguments
  + Organize and write papers and proposals
  + Give talks
* Role
  + Teacher
  + Guide
  + Promoter
    - Opportunities and connections
  + Network seed
    - Introduce to right collaborators

Student

* Role
  + Manager of experience
    - Meet regularly
    - Discuss short-term progress
    - Periodically discuss longer-term plans
    - Decide on communicate frequency and mechanism
    - Bring written plan
    - Speak about why progress is at is current state
    - Which research area
      * Talk to professors
      * Talk to other students
  + Proactive and organized
  + Effectively communicate
    - What matters when looking for advisors
  + Take and seek out advantage of other resources
  + Open to advisor’s and mentors’ guidance

Mentor

* Establishing a relationship
  + Advocator
  + Look out for you
  + Advice
  + Provide contact information
* Should be a mentor

Need to have balance

Additional Support

* Volunteer to present work
* Feedback

Professional Ethics

* Don’t plagiarize
* Cannot submit same paper to conference and journal simultaneously
* Expose complete picture