



University of Pittsburgh



# INFSCI 3005: Introduction to Doctoral Program

Peter Brusilovsky, Professor  
School of Information Sciences and Intelligent  
Systems Program  
University of Pittsburgh

With materials and inspiration from professors Marek Druzdzel,  
Stephen Hirtle, and Paul Munro





## Parts of this presentation

- Part I: Introduction to this class
  - What we will learn
  - How we will do it
  - What kind of activities
- Part II: The Structure of the IS and ISP PhD programs at SCI
  - Courses
  - Exams
  - Dissertation



## I. Why this Course?

- You are our younger colleagues and we want you to succeed in your studies
- Your success is closely related to the success of this school
- You need to learn how to do research and how to succeed as scientists
- Most scientists learn from their mentors (formal advisors and beyond!)
- But it might be not enough



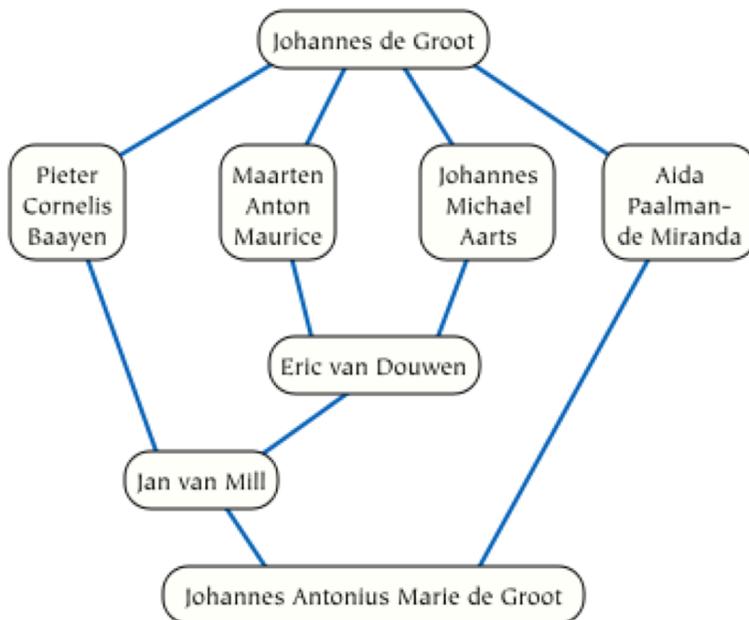
# The Master-Apprentice Model

- Your success (in science but also elsewhere) depends on your hard work, intelligence, but also on your skills.
- A beginning scientist needs to learn how to do research and how to succeed.
- Most scientists learn this from their advisors (the *master-apprentice* model).
- This model is used in every domain that is hard to master.



# Scientific Genealogy

- **All scientists in the history of humankind can be organized into a genealogy graph (often, but not necessarily, a tree)**
- **So call all musicians, chess players, sport players**



“An example of an academic genealogy, the supervisory relationship between Dutch topologist Johannes De Groot and his namesake, also a Dutch topologist descended from the senior De Groot via four different paths of academic supervision.”

[http://en.wikipedia.org/wiki/Academic\\_genealogy](http://en.wikipedia.org/wiki/Academic_genealogy)



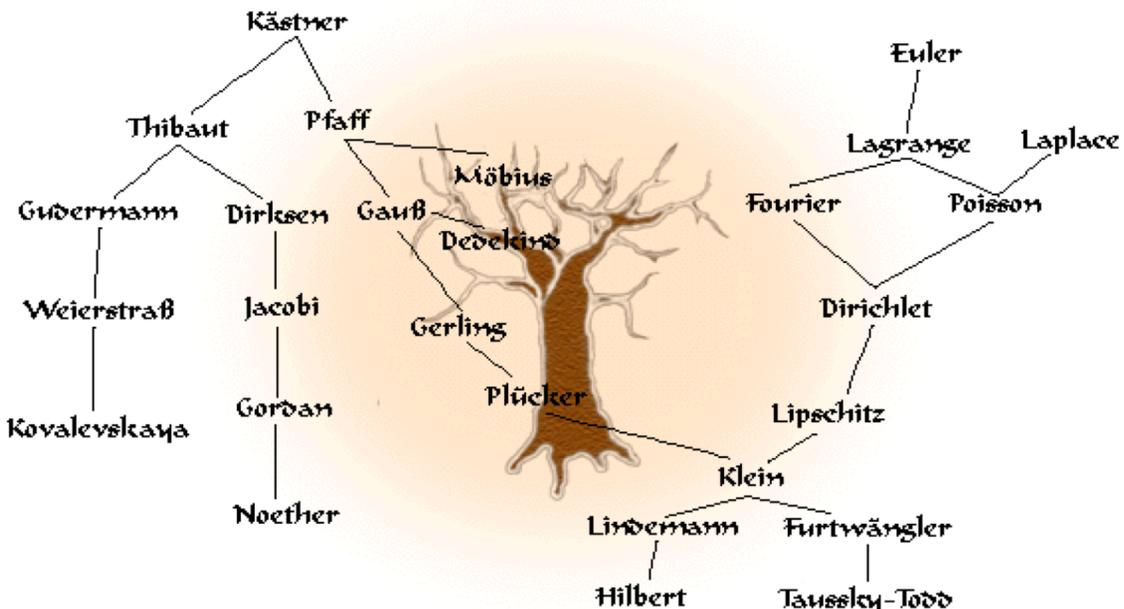
# Mathematics



## Mathematics Genealogy Project

- Home
- Search
- Extrema
- About MGP ▶
- Links
- FAQs
- Posters
- Submit Data
- Contact
- Donate

A service of the [NDSU Department of Mathematics](#), in association with the [American Mathematical Society](#).



Quick Search

[Advanced Search](#)

246385 records as of 29 August 2019

View the [growth](#) of the genealogy project



University of Pittsburgh

# Genealogy in Other Disciplines



Chadwick (the discoverer of the neutron) was a student of Rutherford (discoverer of the proton) who was the student of Thomson (the discoverer of the electron).



## The Master-Apprentice model: Pitfalls

- What you will learn depends on the knowledge of your advisor but also on his/her ability to transfer this knowledge.
- But what if your advisor is unable to transfer mastery to you?
- There are otherwise no courses that teach this 😞.



## Goals

- Pass a concentrated set of meta-knowledge about PhD, science, academia, research career
- Figure out what you need to learn in the course of your doctoral studies.
- Get started as a researcher as soon as possible
  - Research from Year 1
- Defend a strong thesis work
- Succeed in your career!



# Key Groups of Topics to Learn

- What is Science?
  - Scientific Enterprise
- How to get there?
  - What do you need to know to be a successful PhD student?
- Science as a career
  - What do you need to know to be a successful academic / faculty / researcher



# Scientific Enterprise

- Tell a little about the working of science and the duties of a scientist /academic.
- Review skills that are fundamental to working in a US scientific environment.

(These skills, are so fundamental to working as a scientist that they are universally useful, no matter where you are on Earth.)

- They should help you with succeeding in any environment!

(Science is global these days and a scientist does the same thing, no matter where he/she is.)



## Research Skills

- How to do research: aka *How Science Works*
- Dealing with research literature: finding, citing, reference management
- Doing it
  - Development, data collection, user studies
- Publishing
- Presenting
- Funding



# Being a PhD Student

- Looking around
  - Interesting research direction, ideas
  - How other people do research: learn from example
  - How to find information
- Learning from others
  - Reading, reading, reading
  - Attending research seminars
  - Making most of research conferences
- Advisor: Finding advisor, working with advisor
- Dissertation Committee
- Expectations: Hours of work, publishing, what's critical



# Being a Faculty and Researcher

- Research Infrastructure
  - Running your lab
  - Grant hunting
- Teaching
- Service
  - Journal and conference reviewing
  - Conference and workshop organization
  - Professional societies
  - Editorship
- Special issues
  - Ethics, time management, job hunting, networking...
- Career building



# Bringing it Together: IS3005 Topics

1. How does science work?
2. What is research?
3. Identifying good research problems
4. Writing papers
5. Presentation in front of an audience
6. Obtaining funding
7. Reviewing/refereeing the work of others
8. Teaching
9. Guiding students, running a lab, managing projects
10. Scientific creativity
11. Information finding
12. Career planning
13. Interacting with people and networking
14. Marketing your skills: job hunt
15. Balancing your life between work and family
16. Coping with stress
17. Ethics in science
18. Appreciation for quality rather than quantity

AKA: Eighteen fundamental skills of a scientist by Prof. Marek Druzdzel



## How We Will Learn It?

- Lectures
  - Overview of topics
  - Presentations from faculty
  - Videos
  - Discussions
- Course Project
- Pitt research modules and certifications
- Attending Colloquia/Defenses @ Pitt and CMU
- Practice
  - Your own work



# Processing and Discussing Lectures

- Every week!
- Review the content of the lecture and examine the assigned reading.
- Post brief feedback to the lecture discussion
  - a reaction to some new knowledge
  - a concern
  - a question
  - relevant related information
- React to some posts of your classmates.
- You will receive up to one point for this work every week. Complete the discussion before the next class to get it reflected in your grade.



# Attending Colloquia

- Every week!
- Use CoMeT System
  - <http://halley.exp.sis.pitt.edu/comet>
- Attend 1 regular (1-hour) colloquium, PhD proposal defense, or PhD defense per week, post a brief summary to the weekly seminar discussion
  - no more than 5 from one series for IS
  - ISP forum is mandatory for ISP, but counts as one post
  - at least one of the attended talks **should** be a real PhD defense
  - **Consider** at least one PhD proposal (recommended, but not required)
- Watch for “career” lectures and other relevant talks posted to IS3005 group.



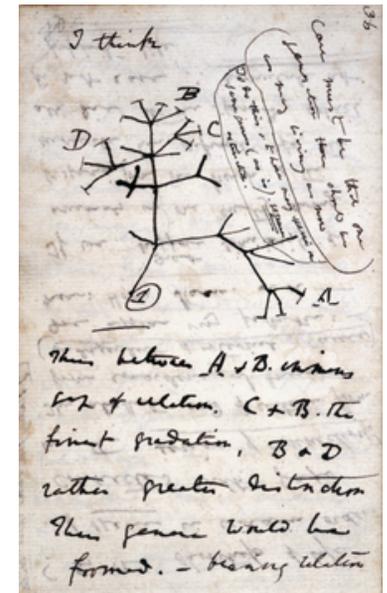
# Finding Colloquia

- Find and post to CoMeT system 1 colloquium or Webinar per week
- Practice your skills in using multiple source of information locally (in Pittsburgh) and globally (Webinars)
- Post with essential details
  - Speaker and affiliation
  - Abstract
  - How to attend (location, link)
  - Series (if it is a part of)
  - Organization
  - Host (person)
- Do not post duplicates, check before posting!
- Share a link to the posted talk in the current week “Seminar” discussion and add a brief comment on why you posted this talk and why it is valuable to attend



# Research Journal

- Researchers maintain their research journals (logs).
- Researchers usually log all important things to remember to their logs
  - Summary / ideas from talks they attended
  - papers they read
  - research ideas
  - project plans
  - notes on interesting people met
  - ideas of new papers, etc.





## Your “split” Research Journal at 3005

- We explored several ways to maintain journals at 3005...  
It is another compromise this year:
- Talks: Weekly discussion to share links and summaries
  - One post with a link to seminar that you posted – explain why you think it is a good one...
  - One post with a summary of the attended seminar
- Papers: One discussion to share paper summary once
  - Feel free to do more! Could get EC points....
- Feel free to post anything relevant to your research to the weekly topic discussion



## Research Project

- Progress from a research idea to a research proposal in 4 stages
- Research idea AKA elevator pitch
- Analysis of past work (paper presentation)
- White paper
- Final research project to be peer reviewed



# Home Page and Class Introduction

- As a PhD student, you are expected to establish a home page outlining your research interest, progress, and other relevant information
- Very important tool to promote you and your work!
- Use your Pitt Web space
  - Your page will look like mine - <http://sites.pitt.edu/~peterb/> -
  - this is where others will be looking for it and this is what our School will advertise
  - To access your Web space, connect by SFTP to [unixs.cis.pitt.edu](http://unixs.cis.pitt.edu), use folder `public/html` in your account
- Share link to your home page in the Class Introduction discussion!



# Requirements and Grading

- Course attendance (weekly)
- Topic reading and lecture discussion (weekly)
- Finding and attending colloquia or defenses (weekly)
- Course project
  - Get research idea, read and present a relevant paper, write a white paper and present a grant proposal
- Practicing peer review (White papers /proposals)
- Home Page
- Pitt Research Certifications (RC, Human Subjects..)



## What You Will Get out of This?

- Generally, as much as you put into it
- The true value of this seminar is in getting you to think seriously about your career.
- You will organize your knowledge of the most important, fundamental skills of a scientist.
- You may feel bored now and then, but ...
- If, during each of our meetings, you get one good idea that you will assimilate and use throughout your career, you will have made a great investment.
- Experience with teaching these skills shows consistently that they are priceless.

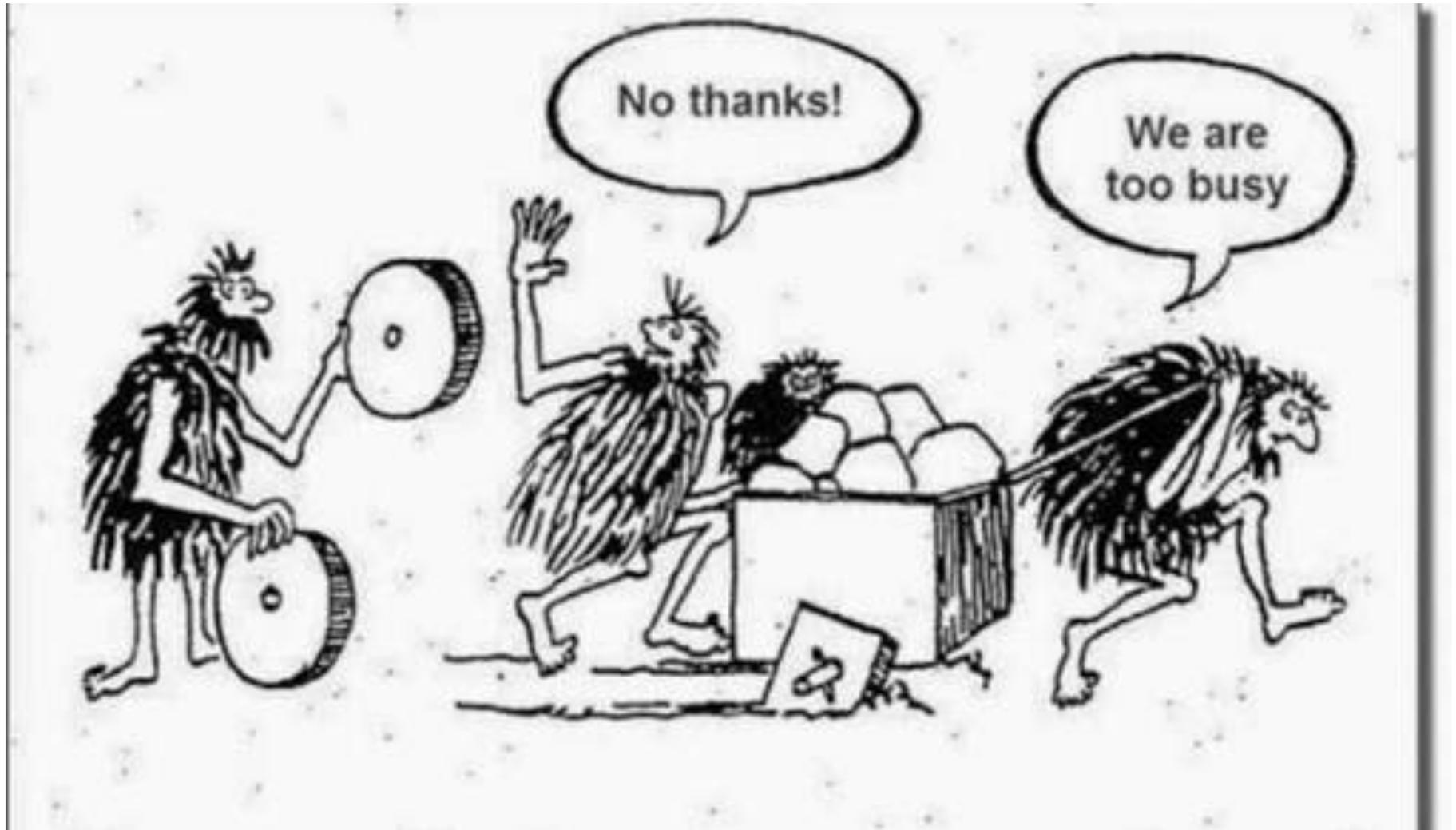


## What I Will Give You

- All that I know and that I believe to be worth passing to you (and anything else that you may be interested in).
- I have much more experience to share than fits the slides – ask good questions!
- I will plan time to meet with you outside of the class



# Giving and Taking...





## What I Expect from You

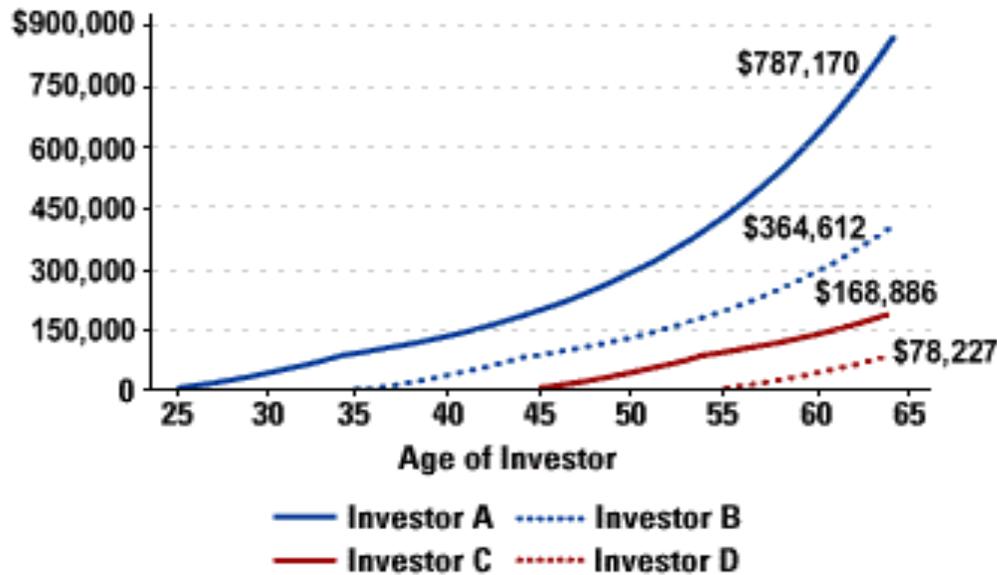
- Come to class meetings.
- Be active (ask, add, disagree).
- Help me to improve this course for the sake of your younger colleagues.
- Pass these skills to your younger colleagues.
- Relate the contents of this class to your professional career.
- Succeed and make our university famous!



# Invest early!

**"Give me back my youth!" -- Goethe**

Assumes investment of \$5,000 a year for ten years only.



**Print:** We made this pretty chart with the assumption that the investment earns a certain rate of return a year after taxes and that all dividends and distributions were reinvested. It's a hypothetical illustration (as opposed to a completely freehand one) and is not intended to represent the expected earnings of any investment. There. Now our year's happy.

- Invest into your skills as soon as you can (and not later than now 😊).
- You will reap the fruits for the rest of your career!



## II. Structure of ISP/IS PhD programs

- Prerequisite courses (English, HIP, ..)
- Coursework
  - <http://sci.pitt.edu/academics/doctoral/isp/>
  - <http://sci.pitt.edu/academics/doctoral/is/>
- Preliminary examination
  - Course requirements for IS
  - Examination
- Comprehensive examination
- Dissertation proposal
- Dissertation defense
- Timeline
- Expectations



## Coursework for PhD in IS

- IS situation more complex than ISP
  - 48 credits for MS graduates, students without MS need to take 12 extra credits (60)
  - Part of the coursework treated as a preparation for the comp exam
  - IS has five graduate prerequisite courses – need to be completed if missing!
- Required coursework (30 credits)
  - Four core courses (12 credits)
  - One introductory doctoral seminar (3 credits)
  - Two topical doctoral seminars (6 credits)
  - Two independent research studies (6 credits)
  - One advanced statistics (3 credits)

} 27 credits: treated as a preparation for prelim. examination
- Dissertation work (18 credits)
  - A minimum of 18 credits of dissertation study



## Prerequisite Courses for IS PhD

- Have to be completed before enrollment or within first 4 terms. Not considered for your 48 credits, but could be a part of 60 for students started without MS
- Statistics or Discrete Math (e.g., IS 2060 Statistics or IS 2020 Mathematical Foundations)
- Cognitive Psychology (e.g., IS 2300 Human Info Processing or IS 2350 Human Factors)
- Systems Analysis and Design (e.g., IS 2510 Information Systems)
- Data Structures (e.g., IS 2500 Data Structures)
- Database Management (e.g., IS 2710 Database Management)



# Preliminary Examination

- “Prelim” is focused on *research*
  - You already demonstrated that you can pass exams in your BS (and MS) coursework
  - Show that you could produce publishable quality work and research papers
- An important and quite likely the most stressful and relatively hardest hurdle in the program
- This is where you show that you can make it
- 3-4 semesters in preparation!
  - IS – Second January of your PhD studies
  - ISP – End of the second semester



# Preliminary Examination for IS: Courses + Defense

- Preparation: Course requirements
  - Four core courses
    - <http://www.ischool.pitt.edu/ist/degrees/phd-details.php>
  - Two independent studies
  - Three doctoral seminars (3005 required)
- Examination
  - Prepare a research paper
  - Present and defend your work
- You don't need to have all the courses completed before the examination but you have to fulfill both in order to formally pass the preliminary examination



# How to prepare to the Prelim

- Learn what good research is
  - Working with literature
  - Doing research
  - Writing
  - Presenting
  - This course is a good start
- Start working on your research early
  - Identify faculty who are doing what you are interested in
  - Find interesting and promising topic
  - Work with advisor and other faculty (2 indep. studies)



# Comprehensive Examination

- An evaluation of the breadth and depth of your knowledge in your area of focus
- Should be relevant to Information Science
- Three legs on which your knowledge of the field rests
- Lot of flexibility in what these three legs are
- Do it when you are ready
  - in terms of having selected your research area and dissertation topic



## Comprehensive Exam Committee

- Your committee (examiners) is very important
- Three IS faculty represent three areas of expertise
- They will guide your reading to help you gaining critical expertise
- First step to dissertation work
  - Prelim work will be a ground of your thesis review part
  - Your examiners will likely be on your thesis committee



# Dissertation Proposal

- Identify Dissertation Advisor
- Form your dissertation committee
  - Four committee members
  - Three program faculty, one external member
- Prepare and defend your proposal
  - A contract between you and your doctoral committee
- Once you defended the proposal, you will become a *PhD Candidate*
  - Do it early rather than late



# Dissertation Defense

- Your final examination in this program
- Complete the proposed study
- Write your thesis
  - Most important publication of your life
  - Accessible to all world online
- Defend your work
- After this examination, you will be a scientist with a license



# A Sample Timeline (IS)

First Year Fall		IS 3005	Core Course	Prerequisite	
First Year Spring		Independent Study	Doc Seminar	Core Course	
First Year Summer		Independent Study, Statistics, Last Prerequisite Courses, research and/or teaching			
Second Year Fall		Doc Seminar	Core Course	Research Study	
Second Year Spring	Preliminary Examination	Core Course	Core Course	Advanced Statistics	
Second Year Summer		Independent Study, research and/or teaching			
Third Year Fall		Electives	Electives	Electives	
Third Year Spring	Comprehensive Exam	Dissertation Work			
Fourth Year Fall	Dissertation Proposal Defense	Dissertation Work			
Fifth Year Spring	Dissertation Defense	Dissertation Work			



## How Long does it Really Takes

- Yes, you can do it in 5 years – i.e., if you work hard and all goes well
- Things happen, however
  - Delayed on prelim
  - Change of topic and advisor
  - Not sure what you want
  - The idea does not work
  - Need to assemble a strong vita for the job market
- Expectation: no more than 6 years
  - Statute of Limitations



# Are you on Track? Annual Progress Review

- Students and their advisors independently fill out a progress report form,
  - IS: mid-January
  - ISP: mid November
- Progress review meeting about two weeks later.
- Progress of every student is individually discussed by the faculty and every student receives a letter from the chair of the Ph.D. Committee.
- Why it is called Black Friday?



## Informal Message from the Faculty

- Focus on your research and not on your courses.
- The course requirements are minimal.
- If you do so, all examinations, including the preliminary examination, are going to be easy for you.