

# CSE 591: Introduction to Graduate Study in CSE at WUSTL



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These slides and audio/video recordings of this class lecture are at:  
<http://www.cse.wustl.edu/~jain/cse591-18/>



1. Goals of this course
2. Introductions
3. How is PhD Different?
4. Rotations
5. Literature Search

Acknowledgement: Rehashed from previous offerings of this course at WUSTL by Prof. Sanmay Das, Patrick Crowley, Kunal Agrawal, and Roger Chamberlain.

# Goals

1. To ensure that our newly admitted PhD students are successful in completing their PhD here.
2. To introduce our research areas
3. WUSTL research/library facilities
4. Explain key steps in research
5. Ethics in research
6. Help match students to their CSE research advisor
  - ❑ Your current advisor is only a course advisor.
  - ❑ The research advisor will fund you for the rest of your PhD.



# Introductions

## About me:

- ❑ 1972-1974: Indian Institute of Science, Bangalore (M.S.)
- ❑ 1974-1978: Harvard University, Cambridge, MA (Ph.D.)
- ❑ 1978-1994: Digital Equipment Corporation (DEC)
- ❑ 1994-2000: Ohio State University, Columbus, OH
- ❑ 2000-2005: Co-Founder Nayna Networks, San Jose, CA
- ❑ 2005-Present: Washington University in St. Louis

## My Areas of Research:

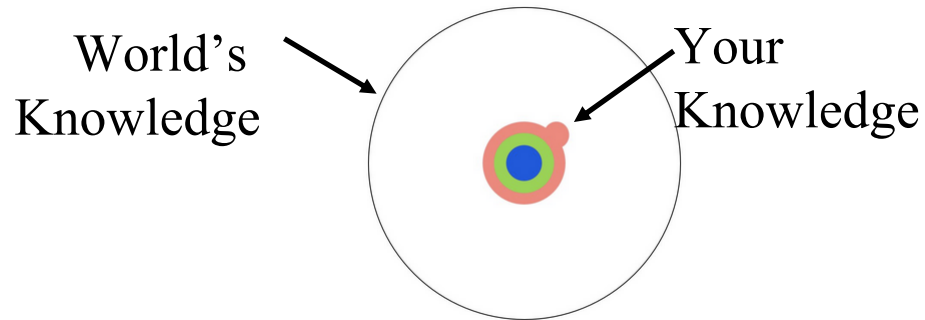
- ❑ PhD Thesis: Operating Systems resource management
- ❑ Joined Performance Analysis group at DEC
- ❑ Analyzed Ethernet  $\Rightarrow$  Architecture of Computer Networks
- ❑ Currently: Cloud Computing, IoT, Cyber Security, Blockchains, Drones

Change is the only constant

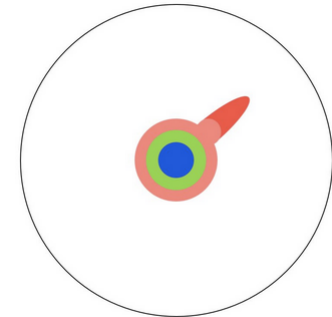
# About You

- Name: \_\_\_\_\_
- Email: \_\_\_\_\_
- Phone: \_\_\_\_\_
- Previous Degree: \_\_\_\_\_
- Previous Institution: \_\_\_\_\_
- Location: \_\_\_\_\_
- Previous Specialization (if any): \_\_\_\_\_
- Preferred PhD Areas (if any): \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- Preferred CSE Advisors (if any): \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

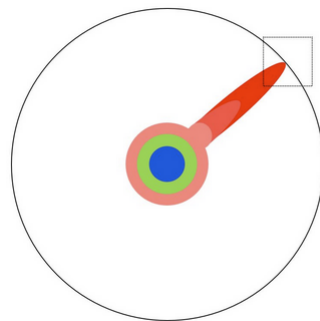
# How is PhD Different?



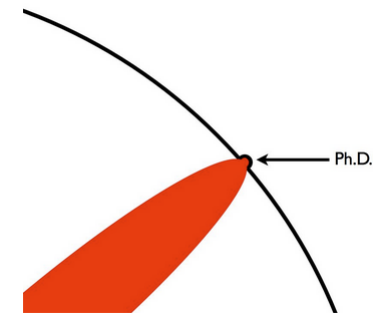
Bachelors



Masters



Reading for PhD



Thesis Complete

# Masters vs. Ph.D.

## □ Masters:

- You do what you are told.
- Thousand others are doing the same thing
- You are a generalist

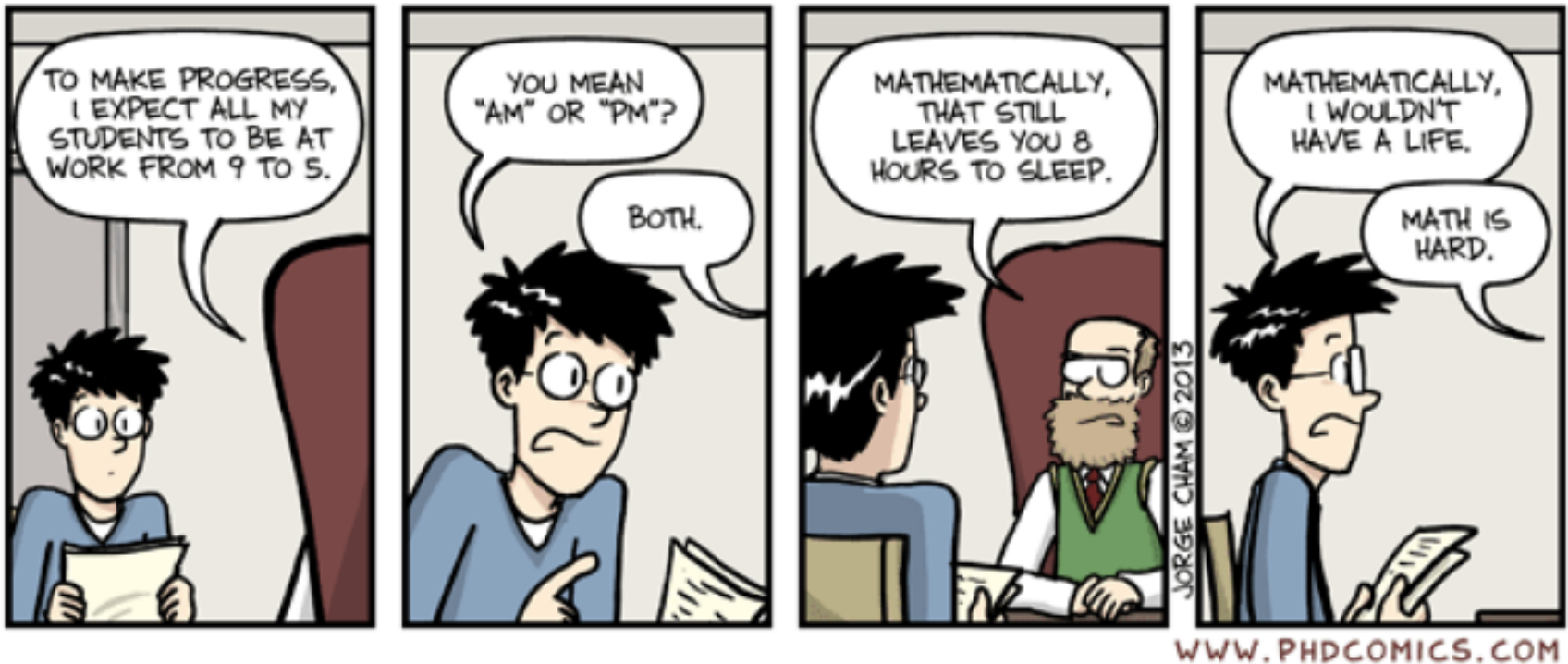


## □ Ph.D.:

- You discover and have freedom to lead your work
- Even advisor is only a coach



# Ph.D. Lifestyle



Ref: [www.phdcomics.com](http://www.phdcomics.com). The cartoon compilations also published in Jorge Cham, "Piled Higher and Deeper: A Graduate Student Comic Strip Collection," Piled Higher & Deeper Pub, June 2002, 176 pp. and its sequels.

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# Ph.D. Lifestyle (Cont)



Ref: [www.phdcomics.com](http://www.phdcomics.com). The cartoon compilations also published in Jorge Cham, "Piled Higher and Deeper: A Graduate Student Comic Strip Collection," Piled Higher & Deeper Pub, June 2002, 176 pp. and its sequels.

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# Key Steps in Research

1. Understand current hot topics in the area:
  - ❑ Literature search
  - ❑ Speed-read a lot of papers
  - ❑ Always keep up-to-date
2. Conceive a new idea
3. Develop a proposal to support the idea
4. Conduct research  $\Rightarrow$  Ethics
5. Communicate the results: papers, code, products



**Goal: Impact/change the world**

# Your Responsibilities

- ❑ Attend every class
- ❑ Do a few simple assignments
- ❑ Do two rotations with two different professors
- ❑ Write a report for each rotation

# Assignments

- ❑ Literature search
- ❑ Reading/writing the critical review of a paper
- ❑ Two rotation reports

# WUSTL CSE Research Areas

- ❑ 20 different faculty members will each talk about their area of research in this class
- ❑ Complete schedule is at the course website:  
<http://www.cse.wustl.edu/~jain/cs591-18/index.html>

# Rotations

- ❑ Visit websites of faculty members
- ❑ You connect with faculty members that are in your area of interest and find one or more potential advisors for the rotation
- ❑ Develop a rotation plan in co-ordination with the advisor  
See <http://www.cse.wustl.edu/~jain/cse591-18/ftp/sample-plan.pdf>
- ❑ After rotation, you write a rotation report.  
Faculty member also fills out a feedback questionnaire.
- ❑ If the faculty member is impressed with your work, she/he may offer you to join his/her group.
- ❑ Everyone needs to do two rotations with two different faculty members.
  - May help later if there is a change in advisor's or your interests.
- ❑ After two rotations, you decide which group to join (if any).

## Rotations (Cont)

- ❑ All departmental fellowships are limited to the first year
- ❑ *Students not finding a research advisor by May will be placed on a probation for the summer.*
- ❑ *Those not finding by August have the option to leave or continue for an MS degree at their own expense.*

# Sample Rotation Plan

## CSE 591 October Rotation Project Plan

Student Name	
Project Title	Adding real-time IP/TCP/UDP port usage statistics to the Passive Network Analyzer
Faculty Director	Patrick Crowley
Graduate Mentor	

### Project Summary and Objective

The Passive Network Analyzer (PNA) is a real-time platform for computer network monitoring and security. The PNA platform was developed by Prof. Crowley and his students to support the rapid and low-cost development of real-time, customized network traffic monitors for use in diagnosing aberrant network traffic and, more generally, in monitoring user-specified network usage characteristics.

In this rotation project, we will develop a new real-time monitor that counts the occurrence of distinct IP/TCP/UDP port numbers in all traffic seen by the PNA device. This monitor will be used to maintain a real-time view of which network services and applications are most active in a network.

The port usage monitor will be based on an existing PNA monitor implementation, so the project activities will include a mix of learning about the PNA platform and modifying an existing monitor to observe port usage.

	Due Date	Description
Milestone 1	7-Oct	Get access to PNA source code and an account on the active node. Demonstrate a fully functioning build environment. Build and deploy the null monitor.
Milestone 2	14-Oct	Study and build the source code for the Source/Dest IP address monitor. Demonstrate the ability to modify the hash table implementation. Demonstrate ability to extract IP/TCP/UDP port numbers from incoming packets.
Milestone 3	21-Oct	Modify the Source/Dest IP address monitor to record most active ports rather than most active source IP/Ethernet MAC addresses. Test and evaluate on live network traffic.
Milestone 4	28-Oct	Capture snapshots of port usage in live traffic, varying observation periods over several days and times of day. Write a brief (2-3 page) report to report your results and summarize your experience.

Ref: <http://www.cse.wustl.edu/~jain/cs591-18/ftp/sample-plan.pdf>

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# Rotation Schedule

- ❑ Monday, September 24, 2018: Plans for rotation 1 due
- ❑ Monday, October 1, 2018: Rotation 1 begins
- ❑ Thursday, October 25, 2018: Plans for rotation 2 due
- ❑ Wednesday, October 31, 2018: Rotation 1 ends
- ❑ Thursday, November 1, 2018: Rotation 2 begins
- ❑ Monday, November 5, 2018: Report for rotation 1 due
- ❑ Friday, November 30, 2018: Rotation 2 ends
- ❑ Monday, December 3, 2018: Report for rotation 2 due

# Professional Activities for Success

- ❑ Join IEEE as a student member: \$32/year (2018)  
Institution of Electrical and Electronic Engineers
- ❑ Join ACM as a student member: \$19/year (2018)  
Automatic Computing Machinery
- ❑ Join key technical discussion lists,  
e.g., Internet Engineering Task Force (IETF) working group  
mailing lists
- ❑ Create a LinkedIn profile: Free
  - Be an active contributor
- ❑ Develop your website:  
Make it the key stop for your technical area

# Grading

- ❑ Rotation 1: 40%
- ❑ Rotation 2: 40%
- ❑ Home works: 10%
- ❑ Attendance: 5%
- ❑ Class Participation: 5%

# Academic Integrity

- ❑ Academic integrity is expected in home works
- ❑ All solutions submitted are expected to be yours and not copied from others or from solution manuals or from Internet
- ❑ All integrity violations will be reported to the department and action taken



"I don't know what plagiarizing is, so I'm gonna take the easy way out and just copy something off the internet."

Cartoon Source: <https://www.tarleton.edu/stulife/judicial/integrity/index.html>

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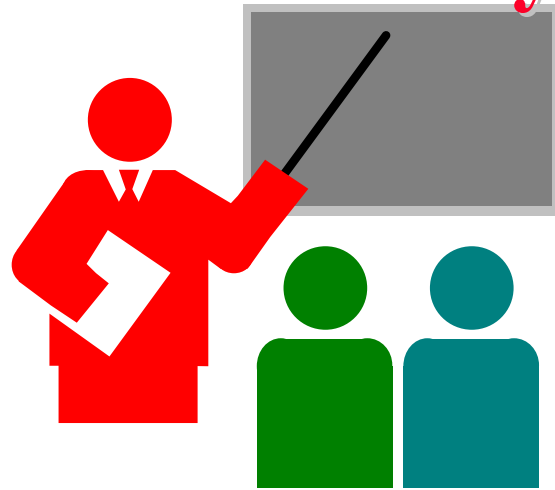
<http://www.cse.wustl.edu/~jain/cse591-18/>

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# Class Discussions

- ❑ We will use Piazza for class discussion.
- ❑ Find our class page at:
- ❑ <https://piazza.com/wustl/fall2018/cse591/home>
- ❑ Please write CSE591 in the subject field of all emails related to this course sent to me.

# Summary



- ❑ Congratulations on getting admission to our PhD program.
- ❑ This course will help you succeed here
- ❑ The first step is to find the research advisor

# Google Search Modifiers

- ❑ filetype:pdf, doc, ppt, pptx
- ❑ site:wustl.com
- ❑ intitle:trend
- ❑ inurl:trend
- ❑ allintitle:Networking Trends
- ❑ Allinurl:
- ❑ “xx” → Exact Phrase
- ❑ OR
- ❑ AND
- ❑ + → Must include
- ❑ - → Not include
- ❑ ~X → X or similar
- ❑ \* → Wildcard

# Homework 1: Literature Search

- ❑ Search web pages, books, and journal articles from IEEE XPlorer, ACM Digital Library, **MOBIUS**, **Safari books**, **ILLIAD** at Olin Library for one of the following topics:

1. *Writing a research paper*
2. *Writing a research proposal*
3. *Study for PhD*

- ❑ On the web try the following search points:

- <http://library.wustl.edu/findart.html>
- <http://library.wustl.edu/fulltext/>
- <http://scholar.google.com>
- <http://books.google.com>
- <http://dl.acm.org/>
- <http://ieeexplore.ieee.org/Xplore/home.jsp>



# Homework 1 (Cont)

- ❑ Ignore all entries dated 2011 or before. Also ignore all entries that do not indicate topic or similar words in the title. List others in the following format (5 each):
  - Author, “Title,” publisher, year, ISBN. (for 5 books)
  - “Title,” URL [One line description] (for 5 web pages)
  - Author, “Title,” source (for 5 technical/magazine articles)
- ❑ For the books, include whether the book is available at WUSTL, MOBIUS, Safari, or ILLiad
- ❑ Serially number the references and submit electronically to [jain@wustl.edu](mailto:jain@wustl.edu). The mail should have a subject field of “**CSE 591 Homework 1**” (Please note the subject carefully. Do not any other characters in the subject). Your answers should be the content of the message and not in an attachment.
- ❑ Make a list of other interesting search points and share in class.

# Common Mistakes in Homework #1

- ❑ Not indicating where the book can be found in WUSTL
- ❑ Listing books/Magazines/journals that have little to do with the topic – may show up in search engines because of a minor mention of the topic or words
- ❑ Web Pages – No one line descriptions
- ❑ Incomplete bibliographic data for journal articles. Need volume, issue, year, pages.
- ❑ Missing journals. Need names of journals dealing with the topic chosen.

# Acronyms

- ❑ ACM      Automatic Computing Machinery
- ❑ CSE      Computer Science and Engineering
- ❑ DEC      Digital Equipment Corporation
- ❑ IEEE     Institution of Electrical and Electronic Engineers
- ❑ IETF     Internet Engineering Task Force
- ❑ IoT      Internet of Things
- ❑ ISBN     International Standard Book Number
- ❑ MS      Master of Science
- ❑ PhD     Doctor of Philosophy
- ❑ URL     Uniform Resource Locator
- ❑ WUSTL   Washington University in St. Louis

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