EVERYTHING YOU WANTED TO KNOW ABOUT GRAD SCHOOL

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Internships

Google

Microsoft

Work

Assistant Professor

Postdoc Researcher

THE UNIVERSITY OF TEXAS AT AUSTIN
Graduate School

- Masters
- PhD
- Startup
- MBA
- MIS
- Software Development
- Financial Companies
Graduate School

- B.E CSE
- Masters
- PhD
- Startup
- MBA
- MIS
- Software Development
- Financial Companies
Matt Might, The Illustrated Guide to a PhD, http://matt.might.net/articles/phd-school-in-pictures/
High School

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Bachelors

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OUTLINE

1. Introduction
2. The Masters Degree
3. PhD and Research
4. Come Work With Me!
OUTLINE

1. Introduction

2. The Masters Degree
   - What does MS involve?
   - How do you apply to MS?
   - Masters FAQ
THE MASTERS DEGREE

Professional degree
- Meant to help software developers get better
Takes 1.5 to 2 years to complete
Usually not funded
Will cost around 8 - 40 lakhs INR per year
THE MASTERS DEGREE

Do 2–4 courses per semester

Each course involves meeting for class twice or thrice in the week for ~75 min

You are expected to come prepared for class

Every class is a ton of work
<table>
<thead>
<tr>
<th>Time</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
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<tbody>
<tr>
<td>6:00AM</td>
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<td>7:45AM</td>
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| 8:50AM |                                             | **Enrolled**
COMP SCI 764
LEC - 001
9:30AM - 10:45AM
COMP SCI 1263 | **Enrolled**
COMP SCI 764
LEC - 001
9:30AM - 10:45AM
COMP SCI 1263 |                                             |                                             |
| 9:55AM |                                             | **Enrolled**
COMP SCI 764
LEC - 001
9:30AM - 10:45AM | **Enrolled**
COMP SCI 764
LEC - 001
9:30AM - 10:45AM |                                             |                                             |
| 11:00AM|                                             | **Enrolled**
COMP SCI 739
LEC - 001
11:00AM - 12:15PM
COMP SCI 1257 | **Enrolled**
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COMP SCI 1257 |                                             |                                             |
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COMP SCI 739
LEC - 001
11:00AM - 12:15PM |                                             |                                             |
| 1:20PM |                                             | **Enrolled**
PE ACTIV 170
LAB - 001
1:20PM - 2:10PM
SE REC FAC 310 | **Enrolled**
PE ACTIV 170
LAB - 001
1:20PM - 2:10PM
SE REC FAC 310 |                                             |                                             |
| 2:25PM |                                             |                                              |                                             |                                             |                                             |

My class schedule in 2010 during Masters
WHAT DO YOU LEARN IN MASTERS?

You learn the state of the art in different areas

Reading, analyzing, and critiquing research papers

Do a size-able project

- Apply the techniques you learnt
- Could end up as a research paper
Memory Management


Extra Material

1. Large pages

Communication


Extra material:

1. Active Messages
Conference on Reliable Awesome Projects

Session 1: Security in a Flash
Slicing Intruders
Matt Fredrikson
Flash Drives: Data Matters
Yupu Zhang and Chong Sun

Session 2: Files and Storage
Singularity ext2
Scott Finley
Towards Automatic RAID
Bryan Vuong and Yiyung Zhang

Session 3: Emulation, meet Virtualization
Xen-ophobias
Theo Benson and Steve Kappes
Flash Emulation
Eric Aderhold and Blayne Field

Session 4: File Systems, PL, and File Systems meets PL
Range Writes
Andrew Krioukov

Later published in OSDI

Professor at CMU
Professor at Purdue
Professor at Duke
Doing a Masters degree does not mean no life outside work

I watched every tamil film that released in Madison, went on long road trips, took Tennis classes
AFTER THE MASTERS DEGREE

Go on to get a PhD

Acquire a more specialized job
  - E.g., verification of chips in Intel
  - E.g., compiler design
  - E.g., software-defined networking at Google

Used as an entry point to the US
  - But many companies directly recruit from India these days
1. Introduction

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MASTERS APPLICATION PROCESS

1. Take the GRE exam
2. Take the TOEFL exam
3. Select universities to apply
4. Get three letters of recommendation (LOR) from your professors
5. Write Statement of Purpose (SOP)
6. Apply before deadline!
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You need to demonstrate technical ability. This is usually done via CGPA (LOR) from your professors
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Minimum barriers.
Doing well does not guarantee admit
Doing badly will cause rejection
1. Take the GRE exam
2. Take the TOEFL exam
3. Select universities to apply

See profiles of alumni who got admits. Use Edulix and other forums. There is no cut-off GPA! Apply for a mix of ambitious and safe schools.
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Crucial part of application. **Do NOT** write them yourself.
Request early - supply resume/SOP
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Least important part of application.
Read for <30 seconds.
Don’t do too much of a bad job.
Don’t spend too much time on it.
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Couriers take time!
Send **reminders** to letter writers
Track what university has received
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Is research experience or publications important?

No. You just need to demonstrate technical ability
MASTERS FAQ

I have GRE Score of X.
Where should I apply?

Your admission is not determined by GRE scores or GPA alone. Your application as a whole is considered relative to other applications — impossible to predict
MASTERS FAQ

How important are extra curriculars?

- Might be a minor plus to your application
- Will not significantly affect admission decision
MASTERS FAQ

I want to do Masters in X. Where should I apply?

At most universities, there is no Masters in X. Only Masters in CS.

You choose what courses you want to study.
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   - PhD Myths and FAQ
The PhD is a apprenticeship

You work with one or more professors and learn how to do research
Research involves making a **significant** contribution to human knowledge.

- **Proving** a new theorem
  - E.g., NP-Complete problem

- Inventing techniques to solve a problem **more efficiently**
  - E.g., File Systems

- Building systems that have **new** capabilities
  - E.g., Database systems
Being a researcher is similar to being an movie director or music composer.

Both involve collaborative, creative work that results in a single product.

Movie Director: Film
Researcher: Publication
Researchers live the **artisan** life style

You create **beautiful** products of **art**

You are **judged** based on your art;

Your skills and taste direct your art; **not your boss**
Artisans are known for their **body of work**

A great film/publication can **influence** others for decades

Artisans have **freedom** in what they want to work on

Artisans are **constrained** by what they can get money to work on

https://thevc.wordpress.com/2012/07/05/movies-and-research/
State of the art

Your Insights

Discussion with advisors

Why Pursue A Ph.D.? Three Practical Reasons, Philip Guo
Why Pursue A Ph.D.? Three Practical Reasons, Philip Guo
A paper presents a research finding

Peers in research community accept papers for publication at a conference

Conference matters!
A paper presents a research finding.

Peers in research at a conference matters!

Not all papers are of same quality.
THE PHD DEGREE

Thumb rule: 3 papers to graduate
Takes 4 to 6 years
“PhD student” is a job
- You get paid $15K to $25K per year
You don’t pay for doing the PhD, but it has a cost
- You would be making much more in industry
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At age 21/22 (right out of undergrad), there is no other job in the world which:

- lets you work on what you like
- get individual credit and fame for your work
- fail (repeatedly) in a safe environment
- and do everything from conception to implementation to marketing for the idea

Why Pursue A Ph.D.? Three Practical Reasons, Philip Guo
WORKING ON WHAT YOU LIKE

Why Pursue A Ph.D.? Three Practical Reasons, Philip Guo
WORKING WITH WHOM YOU LIKE

In industry, you cannot collaborate outside your team

In grad school, you are encouraged to do so!

- You can freely collaborate with students at other universities and companies

I have written papers with 17 people over 4 years

- Collaborators both in industry and universities

Why Pursue A Ph.D.? Three Practical Reasons, Philip Guo
Companies revolve around team work
- Hard to pinpoint what your contribution is
- New employees cannot lead projects

Your ideas belong to the company
- You cannot talk about your work externally

A Phd allows you to build a public portfolio
- Opens up new opportunities
FAIL SAFELY

In finance, if you fail to meet performance expectations, you are fired

In engineering, if you fail in projects, you are stifled (no promotions)

In grad school, failure is routine
   - You are encouraged to fail and grow

Grad school allows you to develop grit, perseverance, and tenacity
MANAGE WHOLE PROJECTS

In industry, different people do different parts of the project

- Overall Vision (top-level management)
- Project Direction (Team Lead/Manager)
- Implementation (that’s you!)
- Marketing
“Doing really first-class work, and knowing it, is as good as wine, women (or men), and song put together”

- Richard Hamming

Turing Award Winner

You and Your Research
WHY NOT PHD?

Uncertainty

Isolation

Opportunity Cost

Bad reasons to do a PhD:

- Prestige
- Social pressure
- Misguided passion
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The most important aspect of your PhD application is prior research experience

Required for admission in the top 4 universities
PHD APPLICATION

1. Take GRE
2. Take TOEFL
3. Select universities
4. Get letters of recommendation from three professors
5. Write a research statement
6. Apply before deadline!
Look at who is publishing in the top conferences in your field

Strong profs in your area of interest matter more than overall ranking

1. Take GRE
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5. Write a research statement
6. Apply before deadline!
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2. Take TOEFL
3. Select universities

4. Get letters of recommendation from three professors

5. Write a research statement

6. Apply before deadline!

Ideally, you would have worked on research projects with all three professors
PHD APPLICATION

1. Take GRE
2. Take TOEFL
3. Select universities
4. Get letters of recommendation from three professors
5. Write a research statement
6. Apply before deadline!

Least important. Be coherent
PHD APPLICATION

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Myth #1:
You have to be a genius to do a PhD

FALSE

If you can get into CEG, you are smart enough for a PhD

Work ethics and hard work matter significantly more
Myth #2: You have to know **exactly** what you want to work on when you apply for PhD

**FALSE**

Tons of people change their interests in grad school (I did)

You have to be highly interested in at least one topic
Myth #3: You can **bypass** normal admission procedures if you just contact a prof

**FALSE**

Influence of prof on admission varies by school

*Read up* before contacting profs!
Getting in Contact

tl;dr:
The best way to get involved in research area Y is almost always to go to that area's reading seminar and actively participate (rather than asking about an independent study or an RA).

So you're thinking about emailing me to talk about <X>? Great!

The Pep Talk

If you're just shy about contacting me, don't be!

Just because you...

- are in [Psychology | Neuroscience | Electrical Engineering]...
- are an undergraduate...
- don't have much research experience...
- think that you're excited by X, even though you're not quite sure what that entails...

...doesn't meant that I don't want to talk to you! There are potential overlaps in my work with other areas, and a lack of research experience has no bearing on whether or not you are creative, curious, good at critical thinking, an excellent communicator, etc.

The Straight Talk

Please do try to be specific in your email; it helps to avoid wasting my time and your time. What does "I want to talk to you about research" mean?
For more information, please check

https://www.youtube.com/watch?v=FLdRJP6Pwjw

https://edxengine.com/course/09296db9/

http://thevc.wordpress.com
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Financial Information

Medical Data

Personal Photos

Government Records
CHALLENGES

Performance

Reliability

NYC Datacenter flooded by Hurricane Sandy
SAFELY UPDATING DATA

Microsoft loses Sidekick users' personal data

Microsoft subsidiary Danger says the Sidekick data, lost following a service disruption, will almost certainly never be retrieved
Reliability mechanisms used today are extremely slow!

System administrators turn off reliability mechanisms

Application developers avoid using reliability mechanisms
Choose One: Performance or Reliability
Choose One:
Performance or Reliability

How do we build systems that achieve both reliability and high performance?
RESEARCH OVERVIEW

Application

Distributed Storage

Local Node

Local Node

Local Node

ALICE [OSDI14]
Storage Verification
[HotOS15]

Blizzard [NSDI14]

TECH TRANSFER

Optimistic Crash Consistency [SOSP13]
No-Order File System [FAST12]
I am interested in..

Cloud Storage

Distributed Systems

Core OS work

Datacenters
I AM LOOKING FOR SMART, MOTIVATED STUDENTS!

STARTING FALL 2016

APPLY NOW!

UT AUSTIN
THANK YOU!

QUESTIONS?

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