Masters vs. PhD

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Revisiting Choices

Nearing the end of your first year of graduate school, you have some questions to ask:

- Am I in the best program for me?
- Now that you’ve had a year under your belt, you have a better understanding of:
  - What I want from the graduate school experience?
    - Likes?
    - Dislikes?
  - What I want as a future career path?
- If not, then how do I get to my preferred track?
  - An Opportunity to Course Correct!
Exercise: Turn And Talk To Your Neighbor

A. What is your plan? MS or PhD?

B. What do you want from the graduate school experience?
   - Likes?
   - Dislikes?

C. What do you want as my future career path?
Who’s in the audience?

How many currently in master’s programs?
- Course masters?
- Thesis masters?

How many in PhD programs?
Grad School Paths

- Re-apply
- Job: Industry/Startup
- Choose Advisor
- Thesis Proposal
- Qualifying Exams
- Submit Papers
- Write Dissertation
- Job Hunt

- MS Course Based
- MS Thesis Project
- PhD

First Year

Job: Industry/Startup/Lab/Academia
MS: Course vs. Research

Course Masters

• Breadth of knowledge may qualify you for marketing, project management roles
• If that’s what you want, take some business classes!
• Lack of major project may be handicap for development roles

Research Masters

• Deep project may qualify you for more interesting development roles
• Much more attractive for a research lab position
• Thesis will help with publications
# Program Comparison

<table>
<thead>
<tr>
<th></th>
<th>Course Based MS</th>
<th>Research MS</th>
<th>PhD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Educational Goals</strong></td>
<td>Acquire knowledge via coursework</td>
<td>Acquire depth &amp; project skills (thesis) Get a taste of research</td>
<td>Do original high-impact research Learn the skills for more research</td>
</tr>
<tr>
<td><strong>Program</strong></td>
<td>Courses are more deep Short time (job hunt) Networking opportunities</td>
<td>Research is not as deep as PhD Shorter commitment Less publications/impact</td>
<td>Long process</td>
</tr>
</tbody>
</table>

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For more details, please see the attached document. This table provides a comparison between Course Based MS, Research MS, and PhD programs, focusing on educational goals and program characteristics. The program at the PhD level is designed for students who want to conduct original high-impact research and learn the skills necessary for more research. The research MS program offers a broader experience, including a dissertation and a taste of research. On the other hand, the course-based MS program is shorter and offers more networking opportunities. The table highlights the differences in depth, commitment, and outcome across the three programs.
MS Career Opportunities

• Types of Jobs
  – Operations and IT type jobs (non-tech industry)
  – Product or application development
  – Research support (Contribute to prototyping and publications)

• Employers
  – Information Technology (IT) companies
  – Companies in other industries
  – Universities (Typically in support roles)
PhD Career Opportunities

- Research or advanced development in industrial research labs
- Development leadership roles in industry
- Technical project management/leadership
- Academic research and teaching in a university as a professor
Experience of the PhD
Lessons from the Roller Coaster

• The ride is similar for most people
  – You are qualified for the ride. It’s scary for everyone!
  – You aren’t alone. Share your experiences!

• It takes externally applied energy for the uphills
  – Your advisor will be a key person (later session on this)
  – Seek support from many sources (technical, emotional)

• There are a lot of downhill sections
  – Frustration and doubt are guaranteed.
  – Things can/will go wrong!

• Momentum is important
  – Keep moving forward. No side trips to distract.
## Technical Ladder Example

<table>
<thead>
<tr>
<th>Example Title</th>
<th>Contribution and Impact</th>
<th>Expertise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fellow/Senior Fellow</td>
<td>Multiple product lines or technologies</td>
<td>Top tech leadership impacts the industry</td>
</tr>
<tr>
<td>Principal Engineer/ Senior PE</td>
<td>Group product line or technology</td>
<td>Technical authority, impacts a business</td>
</tr>
<tr>
<td>Senior Staff Engineer</td>
<td>Multiple products</td>
<td>Project-wise expert, Impacts a product</td>
</tr>
<tr>
<td>Research Scientist</td>
<td>Product, Project Methods</td>
<td>Expert in area of contribution</td>
</tr>
<tr>
<td>Senior Engineer</td>
<td>Portion of a Product/ Project</td>
<td>Working knowledge in one area of contribution</td>
</tr>
<tr>
<td>Engineer</td>
<td>Portion of a Product/ Project</td>
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</tr>
</tbody>
</table>

**Notes:**
- **PhD**
- **MS**
- **BS**
Industry Career: Research and Industry Impact

• Research
  – Engage in scientific discovery, collaborate with peers, fund research (but typically later in career, possibly internal funding)
  – May involve university faculty and students
  – Develop creative thinking about technical solutions to problems

• Technology Transfer
  – Contribute to company’s products, client engagement, open source, intellectual property…
  – Demonstrate strong problem-solving skills
  – Publish work and engage with academia

• Service
  – Departmental (hiring committee)
  – Company–wide (promotion review board)
  – Professional
Academic Career: Research, Teaching, and Service

- **Research**
  - Engage in scientific discovery, involve graduate and undergraduate students, fund research

- **Teaching**
  - Active teaching, mentoring, advising

- **Service**
  - Departmental, University, Professional (External)

Expected to do all three well!
Different Types of Colleges

• **Research Universities**: PhD program – emphasize research, but teaching and service important

• **Colleges/Universities**: MS program – emphasize teaching, research and service also important

• **Selective Liberal Arts Colleges**: BS program -- emphasize teaching with research a close second, but service important

• **Teaching-Oriented Colleges**: BS program – emphasize teaching and service but research can be expected
Academic Career Ladder

• Professorial Ranks
  – Assistant: Tenure-track, 5-7 years
  – Associate: Usually with tenure (life-time appointment)
  – Full
  – Chaired Professor – endowed

• Administrative Ranks
  – Department Chair, Dean, Provost, President

• Instructor – teaching and service

• Postdoctoral/Research Associate – research
What can I do now to prepare for a job in industry?

- **Complete a project(s)**
  - Industry has shifted considerably to applied research
- **Get an internship(s)**
  - Try out a corporate culture, job type, industry
  - Find mentors/supporters of your career
  - Publish your work with co-authors
- **Acquire key skills**
  - Build your professional network, communications, negotiation, making yourself visible
- **Check your competition**
  - Who is graduating soon in your field from other (top) schools?
  - Who works at this company?
What can I do now to prepare for an academic job

• Research
  – Apprenticeship: learn from advisor, doing it, and others
  – Grant writing
  – Corporate connections for funding, student job placement

• Teaching
  – Teaching experience, teaching assistantship, teach some even if you don’t have to
  – Professor-in-training programs, course

• Service
  – Organizing student organization/support groups
  – Working on department committees
  – Volunteering at conferences
Moving Between Research Lab and Academia

From University to Industry
- Must build real systems
- Establish visibility and knowledge in industry

From Industry to University
- Must continue publishing
- Establish visibility in research community
The B. Algorithm!

- if (I.LoveLoveLoveProgramming)
  - PursueMasters() // industry, entrepreneurship
- Else (I.LikeProgramming && I.WantMoneyBefore30) {
  - if (RAND(0, 1.0) < 0.6)
    - FinishBachelors()
  - Else
    - PursueMasters();
- }
- Else if (I.LikeProgramming && I.BelieveTheTruthIsOutThere)
  - PursuePhD(); /* research, tenure track, teaching, industry, labs, entrepreneurship */
- Elseif (I.DontLikeProgramming) {
  - FinishBachelors();
  - BecomeASurfer();
- }
All Choices Are Valid

- People move in all sorts of directions
- Start PhD program – exit after Masters
- Masters – continue to PhD
- Success is wonderful, **happiness** is wonderful