MASTERS VS. PH.D. WHICH ONE TO CHOOSE? HOW FAR TO GO?

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Revisiting Choices

Nearing the end of your first year in either a Ph.D. or MS program, the questions are:

1. Am I in the best program for me, based on a better understanding of
   - What I want (what I love / what I dislike) in the graduate school experience?
   - What I want as a future career path?

2. If not, then how do I get onto my preferred track?
Turn and Talk to your Neighbor

What is my plan: MS or PhD?

What I want (what I love / what I dislike) in the graduate school experience?

What I want as a future career path?
Who’s in the Audience?

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

How many in Ph.D. programs?
About Puja

Senior Research Scientist, Apple Inc. (2014-present)
  • Apple Media Products Discovery Team
  • Personalization & Large Scale Recommendation Systems

PhD, University of Minnesota (2014)
  • Computer Science
  • Thesis: Online Convex Optimization and its Application to Portfolio Selection

Internships
  • IBM T.J. Watson Research Center
  • eBay Inc.

MS, University of Iowa
  • Computer Science; Knowledge Discovery and Data mining

B.Tech, West Bengal University of Technology
  • Information Technology
Where Puja Works

Use the power of Machine Learning to help users discover content within a catalogue that is growing everyday.
Course vs. Research Masters

**Course Masters**

- Breadth of knowledge may qualify you for marketing, project management, product management roles
- If that’s what you want, take some business classes!
- Lack of major project may be a 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)</td>
<td>Do original high-impact research</td>
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<tr>
<td></td>
<td></td>
<td>Get a taste of research</td>
<td>Learn the skills for more research</td>
</tr>
<tr>
<td><strong>Program</strong></td>
<td>Courses are more deep</td>
<td>Research is not as deep as Ph.D.</td>
<td>Long process</td>
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<tr>
<td></td>
<td>Short time (job hunt)</td>
<td>Shorter commitment</td>
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<td></td>
<td>Networking opportunities</td>
<td>Less publications/impact</td>
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Masters 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)
Ph.D. 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 Ph.D.

- Pick advisor, move from coursework to research
- First submission
- Pick a Topic
- Reviewer comments
- Write & defend thesis
- Advisor stress
- Quals
- Job interview invitations
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 & doubt are *guaranteed*. Things can 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-wide 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>
<td>Working knowledge in one area of contribution</td>
</tr>
</tbody>
</table>

- **Ph.D.**
- **M.S.**
- **B.S.**
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 around technical solutions to problems

Technology Transfer
Contribute to company’s products, client engagements, 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

Expected to do all three well!
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: Ph.D. program - emphasize *research* – but teaching, service important

Colleges/universities: M.S. program- emphasize *teaching* – but research & service also important

Selective liberal arts colleges: B.S. program – emphasize *teaching* with research a close second, but service important

Teaching-oriented colleges: B.S. program – emphasize *teaching & service* but research can be expected
Academic Career Ladder

Professorial Ranks
- Assistant: Tenure-track, 5-7 years
- Associate: Usually with tenure
- Full
- Chaired Professor – endowed

Administrative Ranks
- Department Chair, Dean, Provost, President

Instructor – teaching & 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
   Building your professional network, communication, 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 don’t have to
- Professor-in-training programs, courses

Service
- Organizing student organizations/support groups – Women in CS
- 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
All Choices are Valid!

People move in all sorts of directions.

Start Ph.D. program – exit after Masters
Masters – continue to Ph.D.

Success is wonderful, **happiness** is wonderful
Questions?