MASTER’S VS. PH.D.
WHICH ONE TO CHOOSE?
HOW FAR TO GO?

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Rita H. Wouhaybi, Intel Labs
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?
Grad School Paths

First year

- MS course-based
- MS thesis project

PhD

- Coursework to dissertation

Switch

Job lab / academia

Job industry / startup

Reapply

Choose advisor
Qualifying exams
Thesis proposal
Submit papers
Write dissertation
Job hunt
Who’s in the Audience?

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

How many in Ph.D. programs?
Course vs. Research Master’s

Course Master’s

• 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 Master’s

• 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>Educational Goals</th>
<th>Course Based MS</th>
<th>Research MS</th>
<th>PhD</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Acquire knowledge via coursework</td>
<td>Acquire depth &amp; project skills (thesis)</td>
<td>Do original high-impact research</td>
</tr>
<tr>
<td></td>
<td>Get a taste of research</td>
<td>Get a taste of research</td>
<td>Learn the skills for more research</td>
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<th>Program</th>
<th>Course Based MS</th>
<th>Research MS</th>
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<td></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>
<td></td>
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<tr>
<td></td>
<td>Networking opportunities</td>
<td>Less publications/impact</td>
<td></td>
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Master’s Career Opportunities

Types of Jobs:
- Operations (consulting, system administration, technical support/ troubleshooting, web site management)
- Product or application development (design, code and/or test new software, User interface design, human factors analysis and testing, technical documentation, program or product management, project management)
- Research support (Contribute to prototyping and publications)

Employers:
- Information Technology (IT) companies (Software, hardware or services companies, Start-ups, Spectrum of established companies (small to big)
- Companies in other industries: (Banking, insurance, telecommunications, healthcare, environmental engineering, manufacturing, travel, …)
- 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.
Setting Research Goals

• PhD research requires redefining success
  – Class performance is not as important as before
• In research, nobody knows the answer!
  – And half the challenge is in asking good questions!

You’re in the pilot seat
not yet sure of your destination
need a capable crew to help you fly
• Network, mentors, friends.
# Technical Ladder Example

<table>
<thead>
<tr>
<th>Level</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>
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<table>
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<tr>
<th>Degree</th>
<th>Level</th>
<th>Contribution and Impact</th>
<th>Expertise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ph.D.</td>
<td>Engineer</td>
<td>Portion of a Product/Project</td>
<td>Working knowledge in one area of contribution</td>
</tr>
<tr>
<td>M.S.</td>
<td>Senior Engineer</td>
<td>Portion of a Product/Project</td>
<td>Working knowledge in one area of contribution</td>
</tr>
<tr>
<td>B.S.</td>
<td>Engineer</td>
<td>Portion of a Product/Project</td>
<td>Working knowledge in one area of contribution</td>
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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!
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 works at this company
- Who is graduating soon in your field from other (top) schools
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

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 positions/Research Associate - research
What can I do now to prepare for an academic job?

**Research**
- Apprenticeship: learn from advisor, doing it, and others
- Grant writing

**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 (half of AJ’s graduate cohort)

Masters – continue to Ph.D.

Success is wonderful, happiness is wonderful