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

Jodi Tims, Northeastern University
Dilma Da Silva, Texas A&M University
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?
About Jodi: Work

Associate Dean, Khoury College, Northeastern University (2019-present)

Professor and Chair, Baldwin Wallace University (2002-2019)

Associate Professor and Computer Science Coordinator (1999-2002)

Assistant/Associate Professor (1981-1998)

PhD, Computer Science, 1998
About Jodi: Real Life
About Dilma - work

NOW

Since 2014: Professor
Also many administrative roles:
department head, associate dean, interim director of two centers

BEFORE

Principal Engineer & Manager
Qualcomm Research
2 years

Researcher; Manager
IBM T.J. Watson Research Center
12 years

Assistant Professor
University of São Paulo,
Brazil
1996-2000

EDUCATION

PhD
Georgia Tech

BS, MS in Computer Science
University of São Paulo, Brazil

RESEARCH AREAS

Distributed Systems, Operating Systems,
Cybersecurity, CS education, Data Science
About Dilma – fun

“I declare after all there is no enjoyment like Reading! How much sooner one tires of any thing than of a book!”

Jane Austen
Grad School Paths

1. First year
   - MS course
   - MS thesis project

2. PhD
   - Coursework to dissertation

3. Reapply
   - Job industry / startup

   - Choose advisor
   - Qualifying exams
   - Thesis proposal
   - Submit papers
   - Write dissertation
   - Job hunt

4. Job lab / academia
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 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
• Might be faster

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
• Might be slower
# Program Comparison

<table>
<thead>
<tr>
<th></th>
<th>Course Based MS</th>
<th>Research MS</th>
<th>PhD</th>
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</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>
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<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>
</tr>
<tr>
<td></td>
<td>Short time (job hunt)</td>
<td>Shorter commitment</td>
<td>MS, and PhD from different schools</td>
</tr>
<tr>
<td></td>
<td>Networking opportunities (small project)</td>
<td>Less publication/impact</td>
<td>PhD</td>
</tr>
<tr>
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<td></td>
<td>A program where MS/PhD from the same department (faster, less courses)</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
- Quals
- Reviewer comments
- Advisor stress
- Write & defend thesis
Lessons from the Roller Coaster

• Enjoy the Ride
  The difference between scary and fun is merely perspective
  • You *are* qualified for the ride. You aren’t alone.

• Energy is needed for the uphills
  Your advisor will be a key person (later session on this).
  • Frustration and doubt are common
    Seek support from many sources (technical, emotional)

• Momentum is important
  Keep moving forward. Be wary of distractions.

• Riding the ride is a statement about you: persistence
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)
Industry Career: Focus on Impact

• Research/Engineering Impact
  • Engage in scientific discovery, collaborate with peers, fund research
  • Contribute to products, intellectual property, open source, ...
  • Solve hard, practical, unsolved problems
  • Take ideas over the finish line (land changes, publish)

• Vision and Direction
  • Define appropriate strategies
  • Identify gaps and misalignments
  • Map ideas to realistic action plans for yourself and others

• XFN and People
  • Collaborate well with internal and external peers
  • Exhibit strong communication to disseminate ideas
  • Scale yourself through others, bring others along
  • Influence and conflict resolution without escalation

Expected to do all three well!
# Technical Ladder Example

<table>
<thead>
<tr>
<th>Example Title</th>
<th>Contribution and Impact</th>
<th>Leadership Track</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC8+: Principal / Fellow</td>
<td>Multiple product lines or technologies</td>
<td>Director: 50+ rollup</td>
</tr>
<tr>
<td>IC7: Senior Staff Engineer/Scientist</td>
<td>Go-To tech lead for a collection of large projects in an area</td>
<td>M2: 20-50 rollup</td>
</tr>
<tr>
<td>IC6: Staff Engineer/Scientist</td>
<td>Technical lead for medium sized project</td>
<td>M1: 5-20 rollup</td>
</tr>
<tr>
<td>IC5: Senior Engineer/Scientist</td>
<td>Self-defined portion of a project, little to no help needed from tech leads</td>
<td>M0: 0-5 rollup</td>
</tr>
<tr>
<td>IC4: Engineer / Research Scientist</td>
<td>Well-defined portion of a product/project</td>
<td></td>
</tr>
<tr>
<td>IC3: Engineer</td>
<td>Small, well-defined portion of a product/project with clear success criteria</td>
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</tbody>
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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

• Network!
  • Where do your contacts work?
  • Do they enjoy their role? Would you?
Academic Career:
Different Types of Colleges

Research universities: Ph.D. program - emphasize research
but teaching, service important

Masters granting colleges/universities: - emphasize teaching
but research & service also important

Selective liberal arts colleges: B.S. program (no engineering) –
emphasize teaching with research a close second, but service important

Teaching-oriented colleges: B.S. program – emphasize teaching & service
but research/professional development is often expected
Academic Career Ladder

Tenure Track Ranks
- Assistant: 5-7 years
  *(may be able to transfer those years from one institution to another)*
- Associate: Usually with tenure
- Full
- Chaired Professor: usually endowed

Non-tenure Track Ranks
- May have promotion paths
- Common ranks are Instructor, Assistant/Associate/Full Teaching Professor, Professor of the Practice

Administrative Ranks
- Department Chair, Dean, Provost, President

Postdoctoral/Research Associate
- Research, (maybe) teaching, Conferences
- Academic institutions, Industry
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)

• It gets easier over time...

Expected to do all three well!
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, (core classes)
  - Professor-in-training programs, courses

- **Service**
  - Organizing student organizations/support groups – Women in CS
  - Working on dept. committees
  - Volunteering or reviewers at conferences
    - (ask your adviser for help)
Moving Between Industry and Academia

From University to Industry

- Must build real systems
- Establish visibility and knowledge in industry
- Work in industry during summer/sabbatical

From Industry to University

- Must continue publishing
- Establish visibility in research community
- Teach few courses as an adjunct professor; volunteer to give talks or workshops at high schools

The earlier the switch, the easier it will be
All Choices are Valid!

People move in all sorts of directions.

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

Ask for advice ... until you get the advice you want 😊
Questions?