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

A.J. Brush, Microsoft
Amanda Stent, Colby College
Reasons for Grad School in CS

Masters
- Change field (French->CS)
- Specialize (HCI, security)
- Change top-line credential
- Route to immigration

PhD
- Get a job in academia
- Research topic that inspires you
Grad School Paths

MS course -based
MS thesis project
PhD

First year

Coursework to dissertation

Job lab /academia

Job industry /startup

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

Switch

Reapply
Who’s in the Audience?

How many currently in master’s programs? Course masters? Thesis masters?
How many in Ph.D. programs?

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?
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?
# Program Comparison

<table>
<thead>
<tr>
<th></th>
<th>Course Based MS</th>
<th>Research MS</th>
<th>PhD - PAID</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>
</tr>
<tr>
<td></td>
<td>Acquire depth &amp; project skills (thesis)</td>
<td>Get a taste of research</td>
<td>Learn the skills for more research</td>
</tr>
<tr>
<td></td>
<td>Get a taste of research</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Program</strong></td>
<td>Courses are deeper</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><strong>PhD</strong></td>
</tr>
<tr>
<td></td>
<td>Networking opportunities (small project)</td>
<td>Fewer publication/ less impact</td>
<td>MS, and PhD from different schools</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>MS/PhD</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>A program where MS/PhD from the same department (faster, less courses)</td>
</tr>
</tbody>
</table>
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), sometimes in teaching positions
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
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)
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
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

- **Collaboration 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>
<td></td>
</tr>
</tbody>
</table>

- **Ph.D.**
- **M.S.**
- **B.S.**
What can I 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 also 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
- 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
- Academic institutions, Industry
What can I 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?