Supporting PhD Transitions into the Workforce

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Diversifying Career Pathways for Doctoral Students

Wojtek Chodzko-Zajko
Dean of the Graduate College
University of Illinois at Urbana-Champaign
Learning Outcome

To provide an overview of some of the many ways that a central campus unit can promote career diversity in graduate education.
Why Promote Career Diversity for Doctoral Students

• Empower students to pursue fulfilling careers
• Recognize that doctoral graduates are employed in a wide range of fields
• Acknowledge that doctoral students have specific career development needs
How Graduate Colleges can Promote Career Development

• Increase awareness of diversity of career opportunities
• Consider structural factors for career preparation
• Provide student-focused programs and support
Our Approach .... Deliver central programming and resources
Events and Signage

All Day
8/16/2019

Try it Out: Career Paths in Publishing
Are you interested in a career in publishing?

4:00 - 5:00 pm
8/27/2019

Industry Job Search: Career Fair Prep
Learn how to make the most of upcoming career fairs.

All Day
9/25/2019

Try it Out: Career Paths in Data Management
Are you interested in a career in data management?

11:00 am - 12:00 pm
10/18/2019

Coffee & Careers: Nonprofit Management
Want to know more about managing a nonprofit?

https://go.grad.illinois.edu/events
December 1, 2019

Workshops and Events

Making the Most of Winter Break

Sitting on the sidelines this winter while your classmates are getting ahead in their careers can be tough. Here are some ways you can plan for a productive winter break:

- Make a Concrete Plan: Before you begin your break, make a plan for what you want to achieve. This could include reading books, attending workshops, or reaching out to potential employers.
- Stay Engaged: Even during your break, stay connected with your field. Follow industry trends, attend virtual events, and network with professionals.
- Review and Revamp: Take some time to review your resume and cover letter. Make sure they are up-to-date and tailored to your goals.

Hanging Job Postings

Excerpted from: https://gradillinois.edu/hangingjobpostings/

Call for the Social Science Poster Session: 2020 Summer Research Opportunities

Are you a graduate student interested in presenting your research at the 2020 Social Science Research Poster Session? The Graduate College is seeking abstracts for the Poster Session, which will be held virtually on May 20, 2020.

Abstracts should be submitted by March 1, 2020.

For more information, visit: https://gradillinois.edu/postersession/
Lot's of good stuff this week.

10/29 Humanities Career Discovery Group
10/29 Thesis Formatting & Deposit: Join remotely
10/30 GradMAP: Time Management Strategies... See More
10/30 Theories of Change & Social Justice
11/11 Examining Undergraduate Student Experiences
11/12 Networking Between Students & Faculty
11/13 The Value of Graduate Education
11/17 Researcher & Data Manager: The Outside Familiarity
11/19 The Diving Board: On the Value of an MFA
11/21 Building Meaningful Connections in Academia
11/22 Writing: The Art of the Unfinished Draft
11/26 Writing: The Art of the Unfinished Draft
12/01 Graduate Career Services: Preparing for Post-Graduation
12/02 Project Management: Preparing for Post-Graduation
12/03 Grad MAP: Time Management Strategies
12/04 Grad MAP: Time Management Strategies
12/05 Grad MAP: Time Management Strategies

Graduate College Illinois @GradCollegeIL - Sep 30
Get the details...Join us for this week’s workshops
9/30 Thesis Office Hours
9/30 & 10/03 Practice your thesis talks
10/15 Talk like the boss — Qua stories
10/2 Avoid Data Disasters
10/2 Thesen panic? Interview
10/3 Info Session: p PDN’s
10/3 Cafe Co-bake FREE coffee & treats
#GradCollegeIL...now

LAS.ILLINOIS.EDU
Illinois selected to help rethink doctoral education and career pathways

Engageme nts 273
Like Comment Share

Grad College Illinois @GradCollegeIL • Nov 14
Job Search Essentials, Fri. 11/15, 9 AM - 4 PM
Tak e on e workshop or all five! bit.ly/2NvQoNu

These warm in do o r act iviti es includ es FEE coffee & snacks. Join in perso n or remotely.

LAS.ILLINOIS.EDU
Illinois selected to help rethink doctoral education and career pathways

People Reached 537
Engageme nts 27
Like Comment Share
Multiple Delivery Channels

- Offerings adaptable to different schedules and needs
- Included in messages from recruitment through graduation
Stakeholders in Career Development

Campus-level
- Teaching & Writing Centers
- Other Career Offices
- Inter-disciplinary Research Centers

Department-level
- Student Groups
- Mentoring by Faculty
- Pro-seminars

Graduate College
Next Steps

• Career Outcomes & Alumni Tracking
• Culture
• Curricular Alignment
Questions
PhD Plus: Enhancing PhD Student Experience

Phil Trella

December 9, 2019
Learning Outcome

How to create strategic partnerships across the university and beyond to build an ecosystem in support of diverse careers
UVA PhD Student Data Overview

PhD Student Enrollment by School
- Architecture
- Arts & Sciences
- Education
- Engineering
- Medicine
- Nursing

Total: 2091
- Architecture: 1013
- Arts & Sciences: 642
- Education: 215
- Engineering: 170
- Medicine: 33
- Nursing: 18

Average of 365 per year

Doctoral Degrees Granted by Year
- 2014: 450
- 2015: 400
- 2016: 350
- 2017: 300
- 2018: 250
Examination of UVA PhD Graduates from 2008-2009 indicates that while Research Universities are the most prevalent employer for PhD alums, more than 50% of UVA PhDs engage in long-term employment outside of traditional academic roles.

These data are consistent with current national studies conducted at other research universities.

<table>
<thead>
<tr>
<th>Employment Sector</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research University</td>
<td>79</td>
<td>33</td>
</tr>
<tr>
<td>Master’s / Regional University</td>
<td>23</td>
<td>9</td>
</tr>
<tr>
<td>Liberal Arts College</td>
<td>17</td>
<td>7</td>
</tr>
<tr>
<td>Community or Two-year College</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>College or University System</td>
<td>1</td>
<td>Less than 1%</td>
</tr>
<tr>
<td>Preschool, Elementary, Middle, Secondary School or System</td>
<td>16</td>
<td>7</td>
</tr>
<tr>
<td>US Federal Government (Including Military)</td>
<td>13</td>
<td>5</td>
</tr>
<tr>
<td>US State or Local Government</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Non-US Government</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Not-For-Profit Organization or NGO</td>
<td>19</td>
<td>8</td>
</tr>
<tr>
<td>Business/For-Profit Company</td>
<td>67</td>
<td>28</td>
</tr>
<tr>
<td>Total</td>
<td>243</td>
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</tr>
</tbody>
</table>
PhD Student Career Interests Change Over Time

• Asking STEM students over the course of their PhD about their career preferences tells us that many students lose interest in an academic career the closer they get to graduation.

• Those who lose interest in an academic career are no more or less fearful of the academic job market, but they may not enjoy research as much.

## UVA PhD Student Desired Employment Sectors

<table>
<thead>
<tr>
<th>Category</th>
<th>n</th>
<th>Mean</th>
<th>1 - Not at All Desirable</th>
<th>2 - Slightly Desirable</th>
<th>3 - Moderately Desirable</th>
<th>4 - Very Desirable</th>
<th>5 - Extremely Desirable</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Students</td>
<td>346</td>
<td>3.7</td>
<td>9%</td>
<td>12%</td>
<td>19%</td>
<td>22%</td>
<td>38%</td>
</tr>
<tr>
<td>Research university</td>
<td>346</td>
<td>3.7</td>
<td>18%</td>
<td>17%</td>
<td>25%</td>
<td>26%</td>
<td>14%</td>
</tr>
<tr>
<td>Business/For-profit company</td>
<td>345</td>
<td>3.0</td>
<td>20%</td>
<td>19%</td>
<td>25%</td>
<td>21%</td>
<td>16%</td>
</tr>
<tr>
<td>U.S. federal/national government</td>
<td>342</td>
<td>2.9</td>
<td>27%</td>
<td>16%</td>
<td>17%</td>
<td>21%</td>
<td>19%</td>
</tr>
<tr>
<td>Liberal arts college</td>
<td>344</td>
<td>2.9</td>
<td>23%</td>
<td>19%</td>
<td>22%</td>
<td>22%</td>
<td>14%</td>
</tr>
<tr>
<td>Master’s/Regional university</td>
<td>343</td>
<td>2.8</td>
<td>21%</td>
<td>21%</td>
<td>27%</td>
<td>23%</td>
<td>8%</td>
</tr>
<tr>
<td>Not-for-profit organization or NGO</td>
<td>343</td>
<td>2.8</td>
<td>30%</td>
<td>19%</td>
<td>28%</td>
<td>14%</td>
<td>8%</td>
</tr>
<tr>
<td>U.S. state or local government</td>
<td>344</td>
<td>2.5</td>
<td>40%</td>
<td>19%</td>
<td>20%</td>
<td>9%</td>
<td>5%</td>
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<tr>
<td>Non-U.S. (foreign) government</td>
<td>343</td>
<td>2.1</td>
<td>45%</td>
<td>21%</td>
<td>19%</td>
<td>8%</td>
<td>6%</td>
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<tr>
<td>Self-employed</td>
<td>341</td>
<td>2.1</td>
<td>44%</td>
<td>31%</td>
<td>16%</td>
<td>7%</td>
<td></td>
</tr>
<tr>
<td>Community or two-year college</td>
<td>340</td>
<td>1.9</td>
<td>61%</td>
<td>22%</td>
<td>8%</td>
<td>6%</td>
<td></td>
</tr>
<tr>
<td>Preschool, elementary, middle, secondary school or school system</td>
<td>344</td>
<td>1.7</td>
<td>61%</td>
<td>22%</td>
<td>8%</td>
<td>6%</td>
<td></td>
</tr>
</tbody>
</table>

PhD Broad Discipline: All
UVA PhD Alums Job Preparation by Broad Sector

PhD Alums in **Academic Roles** by Graduation Year

<table>
<thead>
<tr>
<th>Year</th>
<th>Cohort</th>
<th>Poorly</th>
<th>Fairly well</th>
<th>Well</th>
<th>Very well</th>
<th>Extremely well</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001-..</td>
<td>64</td>
<td>19%</td>
<td>39%</td>
<td>37%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008-..</td>
<td>80</td>
<td>36%</td>
<td>51%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013-..</td>
<td>104</td>
<td>45%</td>
<td>42%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PhD Alums in **Non-Academic Roles** by Graduation Year

<table>
<thead>
<tr>
<th>Year</th>
<th>Cohort</th>
<th>Poorly</th>
<th>Fairly well</th>
<th>Well</th>
<th>Very well</th>
<th>Extremely well</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001-..</td>
<td>21</td>
<td>24%</td>
<td>57%</td>
<td>14%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008-..</td>
<td>35</td>
<td>23%</td>
<td>49%</td>
<td>26%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013-..</td>
<td>60</td>
<td>12%</td>
<td>25%</td>
<td>38%</td>
<td>17%</td>
<td></td>
</tr>
</tbody>
</table>

Broad Discipline: All | Current Job Sector: Academic

Broad Discipline: All | Current Job Sector: Non-academic
PhD Plus: Program Design

Early Years: Balance, Resilience, Success
- First-Year Foundation Series, Example Topics
  - Leveraging Strengths
  - Effective Communication
- Career Design for 2nd Year Students

Middle Years: Tiered Training Modules for Careers
- Example Modules
  - Science Policy Initiative
  - Graduate Consulting Club
- Tier One: Career Exploration
- Tier Two: Skills Acquisition

Advanced Years
- Tier Three Experiential Learning Opportunities
PhD Plus Launch Event: Shaping the Future of Graduate Education. January 17, 2019
PhD Plus Project Partners

- The University Career Center
- The Center for Teaching Excellence
- The Batten Institute for Entrepreneurship and Innovation
- The Scholars' Lab
- The Science Policy Initiative
- The UVA Library Research Data Services & Sciences
- Contemplative Sciences Center at UVA
- Office of Undergraduate Research
- Center for Survey Research
- The UVA Licensing and Ventures Group
- Weldon Cooper Center for Public Service
- Graduate Consulting Club
- The C’ville Biohub
- Data Science and Analytics Club
- Office of Vice Provost for Academic Outreach
- School of Data Science
- Environmental Resilience Institute
PHD + CORE MODULES

PhD + Core Modules are dynamic extra-curricular training experiences designed to provide students with an enhanced suite of skills and competencies necessary for success across all careers paths. Additional modules will be added as the program develops, so please check back soon.

- Foundations Series
- Career Design
- Communicating Research
- Community Impact
- Consulting
- Data Literacy
- Digital Humanities: Praxis Program
- Entrepreneurship & Commercialization
- Future Faculty
- Science Policy
- Teaching
PhD Plus: Participation is at about 20% of overall Enrollment
Redesigning the Doctorate to Increase Career Opportunities: Two Programs

Elizabeth A. Dolan
Deputy Provost for Graduate Education
To identify common elements in the processes two faculty groups used to redesign doctoral education in their fields. Both began with the goal of increasing and broadening career opportunities for students.
PASTEUR PHD PARTNERS FELLOWSHIP

Blazing a New Trail in STEM PhDs

Pasteur PhD Partners Fellowship

Blazing a New Trail for STEM PhDs

With support from the National Science Foundation, Lehigh University’s innovative Pasteur PhD Partners (P3) Fellowship provides fresh thinking and a new approach to the ecosystem of support and resources around talented young minds pursuing doctoral degrees in science, technology, engineering, and math (STEM).

Named after Louis Pasteur—a researcher driven to solve urgent challenges in the here and now—the P3 Fellowship provides four years of financial support for qualified prospective doctoral candidates.
Lehigh University ecosystem

1775 Graduate Students

College of Education: 466
College of Engineering: 672
College of Business: 257
CAS: 342
Lehigh English Doctoral Program: Literature & Social Justice

Department innovations led by Jenna Lay,
Job Placement Officer (2013-15),
Director of Graduate Studies (2015-19)
Three Initial Decisions

- Reduce the size of the PhD Program
- Increase the size of the MA Program
- Thematic focus: Literature & Social Justice
Literature and Social Justice

By: Set Moglen, Dawn Keetley and Kate Crassons

Almost a decade ago, the Lehigh University English Department made a commitment to use literature as the central intellectual emphasis of our department through his focus, we explore how literary texts make distinctive contributions to urgent ethical, social, and political questions that cross disciplinary and historical boundaries. This commitment has influenced all our faculty hires over the last eight years, it has systematically reshaped our graduate program, and in a range of ways it is now influencing our undergraduate major. Our department has won year-two endowed or endowed faculty, thirty-four graduate students, and roughly forty-ve English majors. We are also responsible for administering an undergraduate writing program required for incoming Lehigh students.
Lehigh English Ph.D. Career Tracking, 2013

2009-2013 (28 graduates)
Data from November 2013

- Tenure Track: 18%
- Adjuncting: 39%
- FF non-IT: 22%
- Other Humanities Careers: 14%
- Unemployed/Unknown: 7%
Lehigh English Ph.D. Career Tracking, 2019

2015-19 (19 graduates)

Data from September 2019

- Tenure Track: 37%
- FT non-TT: 21%
- Other Humanities Careers: 37%
- Adjuncting: 5%
Five-Year Doctoral Placement Comparison

2009-2013 (28 graduates)
Data from November 2013

- Adjuncting: 39%
- Tenure Track: 18%
- FT non-TT: 22%
- Other Humanities Careers: 14%

2015-19 (19 graduates)
Data from September 2019

- Adjuncting: 5%
- Tenure Track: 37%
- Other Humanities Careers: 37%
- FT non-TT: 21%
How did we do it?
Identify the Challenge
• Students are not getting the jobs for which we are training them.

Involve Stakeholders and Allies
• Alumni; current students; career and professional development offices; Ph.D.s working in other offices on campus.

Gather Data and Narratives
• National data and trends from MLA, AAUP, CGS, etc.; career narratives from students and alumni.

Recognize Fears and Anxieties
• Offer opportunities for faculty and students to express trepidation about potential pitfalls or unintended consequences before trying to implement specific changes.

Articulate Shared Values
• What do we hold in common when it comes to graduate education? What does earning a Ph.D. at Lehigh allow students to learn? To do? How can we build on those shared values?

Identify a Positive (Aspirational) Outcome
• Our students will find meaningful, fulfilling careers after their graduate program
What changes did we make?
Culture

1) Job Placement Officer
2) Alumni Career Tracking
3) Alumni Engagement
4) Reading Groups on Humanities Jobs
5) Workshops on Career and Professional Development
6) Recognition and Celebration
7) Mentoring

Curriculum & Structure

1) Visiting Assistant Professorships
2) Certificate in Composition & Rhetoric (integrative rather than additive)
3) Annual Review Process

NEH Next Gen Hums Grant (2016) (in collaboration with History Dept)

1) Introduction to Graduate Studies
2) Public Humanities Course
3) Revised Dissertation Guidelines
4) Co-Curricular Funding Opportunities
STEM
Pasteur PhD Partners Fellowship

Funded by an NSF—
Innovations in Graduate Education Grant

Principal Investigator
Himanshu Jain, Professor of Materials Science and Engineering

Co Principal Investigators
Anand Jagota, Professor of Bioengineering
Volkmar Dierolf, Distinguished Professor of Physics
H. Lynn Columba, Associate Professor of Instructional Tech and Teacher Ed
Daniel J Vaughn, Corning Glass and Incubator Works
### Motivating Factors

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>75% of Engineering PhDs from Lehigh go into industry</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Industry research leaders report that graduating PhDs don’t understand industrial context</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Students from underrepresented groups in STEM are more likely to enter industry directly, rather than pursue graduate education</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Students are more likely to pursue doctorates if they see a clear career path</strong></td>
<td></td>
</tr>
</tbody>
</table>
Survey of Lehigh Engineering PhDs in Industry

Survey of 85 PhDs from 1999-2017

**Particularly strong need**
- Team & project management: includes interpersonal relations, conflict resolution
- Economic considerations in R&D decisions: includes financial analysis; understanding the global marketplace

**Strong need**
- Communication skills
- Safety
- Intellectual property constraints

*Scatterplot of gap vs. level of priority for selected topics in Lehigh STEM doctoral curriculum.*
Donald Stokes’ description of the nature of research (1997)

Use-inspired basic research requires university/industry collaboration.
Two models of STEM Doctoral Education

Traditional—
Curiosity-Driven Research

Doctoral Student enters PI’s lab with funded research underway.

The PI’s curiosity drives the research.

Pasteur PhD-
Use-Inspired Research

Doctoral Student creates a research project inspired by collaboration with industry.

Partnership between student, industry, and doctoral advisor drives the research.
Use-Inspired Doctoral Programs

In the United States

• A few industry and discipline specific PhDs (generally engineering and business collaborations).
• Two that provide research experiences in industry settings—University of Michigan (auto industry), Texas A & M (petroleum engineering)

In Europe

• EPSRC-Funded Centers in UK (Industrial Doctorate)
• CNRS-University partnerships in France
• Doktoringenieur (Dr.-Ing.) German doctorate is use-inspired and industry driven doctorate, greatly facilitated by Institutes of Fraunhofer-Gesellschaft
Workshop on the Role of Industry-University Partnerships in Graduate Education

Goal
To discuss the current model of graduate education, including gaps between training and placement in industry.

Participants
• Leaders (CEO/CTO) of key industries (manufacturing, chemical, IT, healthcare).
• Representatives of international funding agencies, where Pasteur-like programs have succeeded and served industry's needs well.
• Thought leaders in graduate education. YOU!

March 19-20, 2020
Washington DC
https://wordpress.lehigh.edu/inphd/
Key Elements of the Pasteur PhD Partners Program

- 4-5 years fully funded
- Pre-program summer internship
- Co-advisors—Lehigh professor and industry researcher
- Modular professional development courses
- Industry residency (as in medical school)
Funding

Industry Partners contribute $50,000 per year for four years for each student (tuition + stipend)

Lehigh University reduces tuition rate 50%
Modular Courses

- Team and Project-Based Learning
- Intellectual Property Constraints
- Economic Considerations and the Global Marketplace
- Ethical Considerations
- Diversity and Cultural Competence
- Creativity and Innovation Techniques

**1-2 credit hours each, students take 6 credit hours total, Available to ALL science and engineering students at Lehigh**
• How successful are the elements of the program in closing gaps identified by survey of graduates going into industry?
• Does the program recruit a higher number of underrepresented students than a traditional doctorate?
• Do Pasteur PhD Fellows conceptualize, design or execute research differently than students in traditional doctoral programs?
• What impact does the program have on new or existing partnerships between Lehigh and industry?
Identified a gap between field-specific doctoral training and job opportunities
Made decisions based on evidence
Established collaborative relationships
Sought external funding at key moments
Committed to continuous assessment
Discussion Question

Who are the key stakeholders on your campus with respect to the promotion of career diversity across graduate education?
Discussion Question

Does the Graduate College have a role and/or responsibility to assess the degree to which curriculum aligns with changes in career outcomes?
Discussion Question

What is your campus doing to collect and disseminate information about graduate alumni career outcomes?