



# Professional Science Master's: Higher Education's "Hot" Degree

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# Professional Science Master's (PSM) - What is it?

*A new kind of degree that:*

- Prepares graduates for work—outside academia—involved in active science.
- Combines technical competencies with workforce skills, e.g. management, policy, communications, law – “Science Plus!”
- Leads to a wider variety of career options than provided by traditional graduate programs – jobs in business, government, non-profit (BGN)



# Features of the Professional Science Master's Degrees

- Two-year graduate degrees: 36 credits
- Cross-disciplinary courses common
- Offer skills-based courses (e.g. marketing, management, statistics)
- Emphasize writing and communication skills
- Require final project or team experience
- Have employer/industry advisory board
- Require students to participate in employer-based internship



# Professional Science Master's Degree - Why?

## Odd Gap in U.S. Science Graduate Education

- ❑ Strong: Bachelors, PhDs in science.
- ❑ But BA/BS insufficient for science career.
- ❑ Master's considered merely as entry to (or exit from) the PhD.
- ❑ But PhD too long, with uncertain prospects.
- ❑ Attractiveness of PhD declining among domestic students; ~ 20% of majors continue in science/math graduate programs.



# PSM – Why?

## Employers Views:

- Many need PhDs, but not in large numbers
- Do want advanced science skills, Bachelor's not enough
- PLUS...
  - Interdisciplinary teamwork, flexibility
  - Project management
  - Computational skills
  - Communication ability
  - Basic business skills
  - Ethics
  - Legal and regulatory issues



# PSM – Why?

## Science Students Ask:

- If I take time to obtain an advanced degree, will I be able to enter my chosen profession?
- Can I aspire to a level of compensation roughly comparable to my peers in other professions?
- Is a career in science compatible with “having a life”?



# How is the PSM Unique?

- More science (or mathematics) than MBA.
- Often more informatics/computation than science degree.
- More professional skills (business, law, communication) than PhD (and students often interact across multiple programs).
- Connections with potential employers.
- Project or team experience vs. thesis: real world experience.

**As a result, these programs often require more credits than a traditional master's degree and tend to be more rigorous.**



## How is the PSM Unique? (more)

- Curriculum developed in concert with employers and designed to dovetail into present and future job opportunities.
- Based on analysis of demand for graduates, including collection of information from potential employers.
- Addresses emerging needs more quickly – only two years.



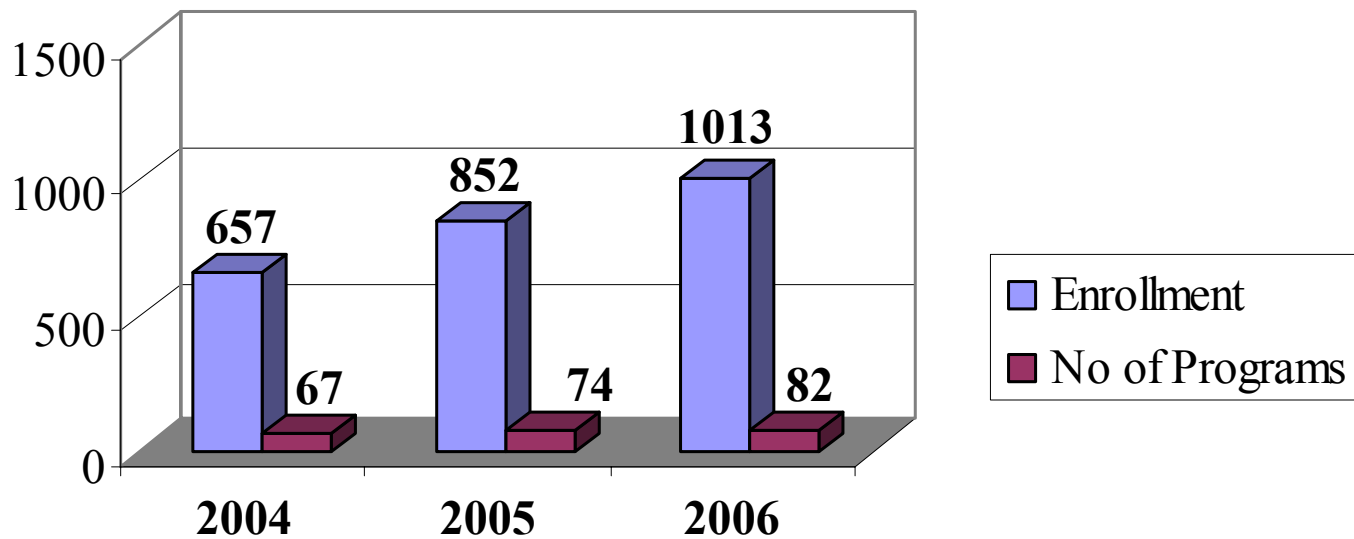
~110 programs, ~55 institutions,  
~20 states

- **Biological Sciences** – Bioinformatics, Biotechnology, Applied BioSciences, Computational Biology
- **Mathematics** – Applied, Financial, Industrial, Statistics for Entrepreneurship, Computational Sciences
- **Physics** – with Business Applications, Physics of Modeling, Industrial Physics, Physics for Entrepreneurship
- **Chemistry** - Computational, Bioanalytical, Biomolecular
- **Forensics**
- **Geographical Information Systems**



# PSM Programs – How Many Enrollees?

**PSM Enrollment and Number of Programs, 2004-2006**



Source: CGS, Survey of PSM Program Directors 2006



# 2006 PSM Graduates by Program

Program	Graduates
Biosciences	122
Bioinformatics	50
Mathematics	36
Environment/Geology	22
Chemical Sciences	7
Physics	8
Computation Science	53
Other	46
Total	344



# Demographics of PSM Enrollees and Graduates, 2005

## ■ Enrollment

- Women - 47%; URM's – 8%; Asians – 11% and 85% U.S. citizens.

## ■ Degrees

- Women – 51%
- Compares with 43% women's share in total master's degrees awarded in natural sciences in 2004



# Who Hires PSM Graduates?

## **Applied Biosciences**

- Eli Lilly
- 3-Dimension Pharmaceuticals (J&J)
- The Institute for Human Genome Therapy
- Health Sciences, Inc.
- Glaxo SmithKline
- Purdue Pharma
- Novartis
- Blue Cross – Blue Shield
- Johnson & Johnson



# Who Hires PSM Graduates?

## **Financial, Industrial Math & Statistics**

- First Federal Bank
- Digital Credit Co.
- Putnam Investments
- Watson-Wyatt
- Chevron
- Lockheed-Martin
- G.E. Capital
- Department of Agriculture
- American Automobile Association



# Starting Salaries for PSM Graduates

- **Private Industry** - \$55,000 - \$62,000
  - Boeing, Chevron, Novartis, Lockheed-Martin, G.E. Capital, Raytheon, Pfizer, Glaxo Smith-Kline
- **Government** - \$45,000 - \$55,000
  - NASA, EPA, USDA, National Center for Food Safety, Mich Council of Governments
- **Nonprofits** - \$45,000 - \$55,000
  - Mayo Clinic, Institute Human Genome Therapy, IIT Research Institute, Institute for Pollution Control



# Starting Salaries of Bachelor's & Master's Degree Scientists 2003

	<b>Biological Sci.</b>	<b>Math &amp; Statistics</b>	<b>Physical Sciences</b>
<b>Bachelor's</b>			
Total	\$29,000	\$36,000	\$35,000
Industry	29,000	42,000	35,000
Government	30,000	40,000	38,000
<b>Master's</b>			
Total	40,000	54,000	49,000
Industry	49,000	63,000	54,000
Government	43,000	S	S

Source: NSF, National Survey of Recent College Graduates, 2003

S - data with unweighted values less than 20 are suppressed.



# Why Should States Consider Establishing PSM Programs?

- The bulk of the new jobs being created are in the non-academic sector; these programs prepare students for employment in non-academe.
- Most universities have a commitment to outreach. PSM programs fit perfectly as they provide well-educated graduates who will apply their skills to endeavors within the state.



# Why Should States Consider Establishing PSM Programs?

- Because master's graduates typically are a less mobile group than PhD recipients.
  - About two-thirds of S&E master's degree graduates were employed in the state in which they earned a degree.
  - About one-fourth of S&E doctorate recipients plan employment in the state in which they earned their PhD
- PSM programs are more popular with women and domestic students than traditional master's programs in Natural Sciences.



# PSM in Federal Legislation

- America COMPETES Act: introduced 3/5/2007 by Senators Reid and McConnell.
- Co-sponsors: 68 - equally split between parties.
- Authorizes funding at NSF for programs to develop and enhance current PSMs.
- No such provision in the House competitiveness legislation. CGS advocating that the conference legislation keep the PSM.



# Council of Graduate Schools/ Sloan National PSM Initiative

- The CGS project consolidates multiple PSM activities under the CGS umbrella.
- Goal: “The institutionalization and promotion of the PSM degree as a regular feature of graduate education.”
- We expect to achieve the following objectives:
  - ▣ Continuation and improvement of existing PSM programs



# Council of Graduate Schools/ Sloan National PSM Initiative

- ❑ Significant increase in the number of students enrolled in all PSM programs
- ❑ Expansion of funding by NSF and other agencies to include PSM programs
- ❑ Increase in the number and variety of employment sector champions of the PSM



# Fifth Biennial Meeting of PSM Program Directors

## **PSM – The First Decade**

- When: November 8-9, 2007
- Where: Hilton Crystal City, Arlington, Va.
- Registration: Online
- Preliminary Agenda – Online

[www.sciencemasters.com](http://www.sciencemasters.com)



# Summary



## ■ Win, Win, Win

- Win for the student – alternative way to remain in science without getting a PhD
- Win for the university - provide students with another career option and help solve community workforce needs
- Win for the employers – local, regional, state – have a technically trained cadre of workers



# For further information: Contact the CGS Project Staff

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Council of Graduate Schools [www.cgsnet.org](http://www.cgsnet.org)  
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