



# Professional Science Master's: A New Kind of Graduate Degree

National Conference of State Legislatures  
Annual Meeting

August 16 , 2006

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

- A degree designed to prepare graduates for work outside academia for local/regional employers; rather than preparation for doctoral study.
- A degree that combines technical competencies with workforce skills, e.g. management, policy, communications, or law.
- A degree in which the program rationale is based on analysis of demand for graduates, including collection of information about non-academic employment opportunities from potential employers



# 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



# Why a Professional Science Master's Degree?

- Odd Gap in U.S. Science Graduate Education
  - BA/BS insufficient as entry degree for science career
  - Master's in science viewed as consolation prize or degree earned on route to PhD
  - PhD too long, with uncertain prospects
    - ~ 21% of undergraduates continue graduate programs
  - But no alternative path to science career. Need for more flexibility, nimbleness in graduate science education.
- But landscape of graduate education is changing
  - Growth is occurring in the professional fields at the master's level
  - Workforce growth is occurring in non-academic sectors
  - Need to match the needs of employers and address competitiveness issues – local, regional, national, and global



# STEM Workforce Needs of Employers

- Need PhDs but not in large numbers
- Bachelor's degree in science insufficient – need advanced science skills
- PLUS ...
  - Interdisciplinary teamwork, flexibility
  - Project management
  - Computational skills
  - Communication ability
  - Basic business skills



# Why is the PSM Unique?

- Developed in concert with industry and designed to dovetail into present and future job opportunities
- The PSM programs have Employer Advisory Boards
- Requires an internship
- Designed to allow students to remain in science without a PhD.
- It's can address emerging needs more quickly – only two years



~100 degrees, ~50 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? How Many Grads?

Over the last three calendar years  
(2003-2005)

- More than 3,400 students have enrolled (more than 1,300 in 2005 alone)
- More than 1,200 students have graduated – about 530 in 2005 alone)



# Demographics of PSM Enrollees and Graduates

- Preliminary 2004-05 Calendar Year Data:  
(22 schools representing 53 programs reporting thus far)
  - Enrollment - 240 women out of 474 total (51% women); 10% URMs and 85% U.S. citizens.
  - Degrees – 65 women out of 121 total (54%).  
Compares with 43% women's share in total master's degrees awarded in natural sciences in 2004



# How Are Employers Helping?

- Advise PSM faculty with curriculum
- Mentor PSM students
- Tuition for employees
- Internships
- Prospective employers
- Champions re: regional economic development



## Employment Data for 2006 PSM Graduates (of sample reporting)

- 96 graduates
- 86 have jobs

One student had 5 job offers – he chose the one where he had interned.

- 1 still interviewing
- 1 not looking
- 6 entering PhD programs



# 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



## 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 choose to apply their enhanced 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 than traditional master's programs in Natural Sciences.



# PSM in Federal Legislation

- S 2109 A Bill to Provide a National Innovation Initiative
- S 2802 American Innovation and Competitiveness Act of 2006
- HR 4734 21<sup>st</sup> Century National Defense Education Act
- HR 5358 Science and Mathematics Education for Competitiveness Act



## The 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



## The Council of Graduate Schools/ Sloan National PSM Initiative (con't)

- ❑ 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



# Summary



- Win, Win, Win
  - Win for the student – alternative way to remain in science
  - Win for the university - provide students with another career option and help solve community workforce needs
  - Win for the community – local, regional, state – technically trained people remain at home



## For further information: Contact the CGS Project Staff

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

