Developing Professional Science Master’s Degree Programs

Dr. David King
Director, SUNY PSM Consortium
Dean of Graduate Studies and Research
SUNY Oswego

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What is unique about the PSM?
The Professional Science Master’s Degree is a Hybrid Professional Degree

STEM

Science
Technology
Engineering
Math

PSM

“PLUS”

Business Skills
Communication Skills
Teamwork Management
Project Management
Presentation Skills
Regulatory Issues
Intellectual Property Law
Financial Management
Etc.
Value of the PSM Degree

- Helps retain talented graduates in state/region
- Builds partnerships between campuses/faculty and business/industry
- Requires Business Advisory Committee for PSM program development and implementation
- PSM is a unique hybrid degree (science + business)
- “PLUS” courses are a unique component: business and communication skills
- Provides professional “STEM” alternative to doctoral degree
- Requires internship or co-op real world job experience for all PSM students
- PSMs are one key to the 21st century innovation economy
**Added Benefits of the PSM Degree**

- Prepares skilled, cross-trained employees for technology oriented business
- Supports greater responsiveness to employer needs
- Promotes university/business partnerships
- Enhances economic and workforce development
- Encourages faculty to engage regional business leaders
- Stimulates technology transfer
The PSM Initiative: Purpose/Goals

- Strengthens master’s level education
- Helps to address the national shortage of domestic students in graduate programs in STEM fields
- Creates another distinctive professional emphasis for master’s degree programs
- Refocuses the mission of the master’s degrees in STEM fields
- Develops new professional career options for students who do not wish to pursue a research doctorate
A System Model: The SUNY PSM Consortium
SUNY PSM Consortium Campuses

University at Albany
- Forensic Biology – enrolling students
- Biodiversity, Conservation & Policy – enrolling students
- Computer Science – enrolling students

Binghamton University
- Geographic Information Systems – enrolling students
- Material Science & Engineering – enrolling students
- Biomedical Anthropology – enrolling students
- Integrated Watershed Studies – in development

The College at Brockport
- Biology – enrolling students

University at Buffalo
- Biophysics – enrolling students
- Natural & Biomedical Sciences – enrolling students
- Computational Chemistry – enrolling students
- Molecular Chemical Biology – enrolling students
- Environmental Geographic Information Systems – enrolling students

Buffalo State College
- Professional Applied and Computational Mathematics – enrolling students
- Great Lakes Ecosystems Science – in development

Cornell University Graduate School
- Applied Statistics – enrolling students
- Food Science and Technology – in development

SUNY Cortland
- Sustainable Energy Systems – in development
- Biomedical Sciences – in development
- Advanced Materials – in development
- Environmental Biology – in development

Empire State College
- “Plus” Certificate in Technology Transfer – in development
- *“Plus” coursework online including Certificates in Project Management and Healthcare Management
SUNY PSM Consortium Campuses

SUNY College of Environmental Science & Forestry
Sustainable Engineering Management – in development
Bioprocess Engineering (track) – enrolling students
Paper Engineering (track) – enrolling students

SUNY Fredonia
Green Business – in development

SUNY Institute of Technology
Applied Mathematics – in development
Health Information Systems – in development

SUNY New Paltz
Computer Science/Data Analytics – in development

SUNY Old Westbury
Program(s) to be identified

SUNY Oneonta
Lake Management – in development

SUNY Oswego
Professional Chemistry – enrolling students
Human Computer Interaction – enrolling students
Health Information Systems – in development
Technology Management – in development

SUNY Plattsburgh
Environmental Policy – enrolling students

SUNY Potsdam
Program(s) to be identified

Stony Brook University
Instrumentation – enrolling students
Chemistry – in development
What are best practices for PSM program development?
PSM Program Development – Best Practices

- Do a market study regarding workforce needs and encourage faculty to “listen” to business partners.

- Organize a Business Advisory Board to collaborate with your PSM program faculty in designing the PSM curriculum, particularly the “PLUS” component.

- Focus on adapting existing STEM degree programs for the development of PSM tracks.

- Encourage campuses to build official PSM affiliation (through KGI-PSM office) into program design.

- Establish a timeline for PSM development and create metrics to benchmark progress.
PSM Program Development – Best Practices (cont.)

- Build a “sustainable” infrastructure to maintain PSM programs for the long term.
- Identify a “point person” or coordinator to develop and lead each PSM program.
- Emphasize the PSM brand by highlighting placements of graduates, employment opportunities, and success stories.
- Seek external funding to promote PSM development, scholarships, etc.
- Develop an assessment regime to monitor program outcomes.
- Solicit internship or co-op placements from employers.
- Facilitate job placement and track the progress of PSM graduates.
PSM Program Development – Best Practices (cont.)

**Vertical Coordination & Support:** PSM program infrastructure must be built from the top down and the bottom up. “Buy in” must come from the program faculty and the administration.

**Communication:** Develop clear lines of communication by establishing a PSM specific website, a program brochure, and a recruiting / marketing / branding campaign.

**Infrastructure:** Lessen bureaucratic tensions and “turf issues” by naming a PSM program director, identifying mentors for students, establishing a Business Advisory Board, and encouraging business leaders to be advocates for the PSM initiative.

**Buy-In:** Ensure success by soliciting faculty “buy in” early, identifying business collaborators and engaging business/industry leaders from the start.

**Implementation:** Utilize the extensive resources of the National Professional Science Masters organization and website, as well as the sciencemasters.com website maintained by KGI-PSM National Affiliation Office.
Possible Impediments to PSM Program Development

**Bureaucracy**: Complex bureaucratic structures and poor communication lines may result in loss of stakeholder support.

**Resources**: The scarcity of institutional resources and competition among various initiatives can place the PSM on the “backburner”.

**Expediting**: Poor communication or coordination can result in severe delays in PSM program development at the campus level.

**Pushback**: Potential for “pushback” from traditional science and MBA faculty.
How to build relationships with business and industry.
Reaching Out to the Business Community

- Consult with Regional Economic Development agencies, local Chambers of Commerce, and other business or industry organizations about your interest in developing a PSM program

- Conduct a market survey to identify the skill needs of employers

- Seek assistance from your campus President to access leadership networks in your community

- Stress that the PSM is an economic driver in economic development regions across the country where PSM programs have been established

- Focusing on economic and workforce development across your region could provide substantial opportunities to expand PSM programs to provide the regional workforce with high-quality, diversely skilled professional employees
Creating a PSM Business Advisory Board

**Diversify Perspectives**: Selecting an advisory board with broad representation and utilizing representatives from several sectors provides the best array of input.

**H.R. Role**: Representatives from human resources or upper level management have the most knowledge of the skills graduates need to succeed in their respective industries.

**Constituencies**: Candidates for Advisory Boards can be identified through a variety of sources including alumni in nonacademic sectors, employers, regional/state economic development officers, community leaders, etc.
The Role of Business Advisory Boards

**Changing Role:** The role of business advisory boards changes as the program moves from the planning phase, to the implementation phase, to the operational and assessment phase.

**Collaboration on Curriculum:** In the planning phase business advisory boards should map out the skills they are looking for and assist in identifying courses that might teach these skills.

**PSM Registration:** In order for a PSM program to be recognized, it must have a Business Advisory Board.

**Enhancing Goals:** After the program has enrolled students, the role of the business advisory board is to fine-tune the program so that it produces the desired results in its graduates.

**Internships & Employment:** Ultimately, the Boards can assist in finding internship placements and identifying employment opportunities.
Engaging Your Business Advisory Board

**Communication**: Maintaining regular contact with your business advisory board helps ensure the success of your PSM program and your students.

**Adaptability**: Programs should be constantly evolving to adapt to the changing business environment. Your board will be the best resource for bridging business and academia to keep programs current and relevant.

**Expectations**: Since business advisory boards may consist of future employers for your graduates, it is important that the students graduating from your program meet employers expectations.

**Substance**: Meetings with your business advisory board should be planned to target specific areas that need attention. These meetings should occur at least once a year and always have a substantive agenda.
PLUS Courses make the PSM degree a unique STEM degree.
Role of “PLUS” Courses

- “PLUS” Courses distinctive component of STEM PSM degrees
- True hybrid professional degree
- Designed primarily to provide STEM graduates with job-related skills to prepare them for supervisory or management positions
- Collaboration between PSM faculty and PSM Business Advisory Boards critical to identifying appropriate “PLUS” Courses for each program
- “PLUS” Courses are typically graduate level foundation courses drawn from business and communication curriculums or specifically designed for PSM degree programs
- Employer input crucial to wise “PLUS” Course selection
- “PLUS” Course selection should be flexible to variable career paths and site placement expectations
Examples of “PLUS” Courses Skill Sets

- Accounting
- Communication Skills
- Critical Thinking & Decision Making
- Economics
- Entrepreneurship
- Ethics
- Finance, Risk Management, & Insurance
- Global Understanding
- Health Care Administration
- Human Resource Management
- Law
- Presentation Skills
- Collaboration Models
- Leadership Training
- Marketing
- Media & Design
- Negotiation/Consensus Building
- Organization Management
- Project Management
- Public Policy
- Running Clinical Trials
- Statistics
- Team Management
- Technology Transfer
Utilizing “PLUS” Courses

- Design a PLUS Course survey with employers that identifies relevant skill sets that might be incorporated in the curriculum of each PSM program.

- Consider utilizing flexible instructional modes, including online and hybrid PLUS Courses. These PLUS Courses have value to other PSM programs and online delivery promotes collaboration among universities to ensure enrollments are optimized and costs are stabilized.

- Seek guidance from external consultants and those with established PSM programs. The results of these meetings may be useful in identifying skills sets that should be addressed within PLUS Courses.
Major Challenges for Delivering “PLUS” Courses

- Specialized PLUS Courses difficult to support on small campuses or institutions that lack business or communication programs.

- Sharing PLUS Courses among campuses and universities makes a more cost-efficient model.

- Challenge to aggregate enrollment to create a fiscally sustainable critical mass of graduate students.

- Particularly true for specialized courses such as regulatory affairs with content that varies widely among different industries and businesses.

- Many campuses cannot support such specialized expertise.

- Consequently, a goal of National PSM System Directors is to build an on-line inventory of PLUS Courses to serve the needs of many PSM programs.

- SUNY system (for example) is building an on-line inventory of “PLUS” courses through the SUNY Learning Network. California State University system is also doing this.
Developing Online “PLUS” / PSM Courses

- Help to create critical mass of enrollment for very specialized “Plus” courses

- Online courses expand access to “Plus” courses and PSM degree programs

- Maximize the economies of scale by pooling “plus” course expertise for other programs to access

- Contribute to the growing national network of PSM online programs

- Provide access to the services of trained instructional designers to assist in online course development

- Build an inventory of “best practices” and shared expertise

- Provide access to PSM degrees for military personnel and other transient potential students
**SUNY PLUS Course Inventory**

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The importance of the PSM internship experience.
PSM Internships Are Vital to Sustaining PSM Programs

- Internships provide benefits to each of the parties involved.
- First, **COMPANIES** get to “test drive” some of the highest caliber students available for possible future employment.
- Second, **STUDENTS** get to receive real world, hands-on experience in a career field related to their specific program to get an idea of what types of responsibilities and duties will be expected of them upon graduation.
- Third, the **INSTITUTION** and **PROGRAM** have a great opportunity to highlight the best and brightest of their students and create collaboration opportunities.
- Fourth, the **REGION** is provided an economic boost.
Benefitting Employers

**Talent Search:** Internships have long been seen as a trial period for companies to recruit talent before they enter the job market.

**Flexibility:** Internships in PSM programs are helpful in that they can serve multiple functions from either the STEM or business side of the company.

**Recruiting:** Internships are a more cost-effective way for companies to staff their departments/projects than hiring full-time employees, especially if those full-time employees don’t have the skills possessed by a PSM student.

**Teamwork:** PSM internships are typically project-oriented and often require collaboration with a team.
Benefitting Students

**Reality Check**: Students are given an opportunity to explore the field for which they are preparing. This gives the student a reality check about their chosen career path.

**Theory → Practice**: Students are able to put what they’ve learned into action. Since the PSM is a hybrid degree, providing a broad range of skill sets, the student can experience the full potential of their degree.

**Compensation**: A paid internship will also benefit the student by helping to defray the costs of continuing their education. Not all PSM internships are paid.

**Academic Credit**: Whether paid or unpaid, most internships can be configured for students to earn academic credit.
Benefitting PSM Institutions and Programs

**PSM Branding:** Some employers aren’t aware of PSM degrees. PSM programs help academic institutions build a reputation in the business community.

**Partnerships:** Internships, co-ops, or other collaborative opportunities exist in partnerships between business and educational institutions that can contribute to long-term successes for both partners.

**PSM Curriculum:** PSM programs can also recruit individuals from regional companies to serve on PSM advisory boards to help ensure that the skills needed in their field are being provided by the PSM curriculum.
Benefitting Regions

**Educated Workforce**: PSM internships and degree programs provide the region as a whole with a more educated, engaged, and prepared labor force.

**Community Building**: By increasing cooperation between businesses and higher education, internships help to build partnerships in the region, that promote economic development.

**Increased Retention**: Internships increase the likelihood of interns staying in the state/region after graduation.

**Attract New Business**: Successful internship programs attract new businesses to the area where they can draw from highly skilled talent.

**Engaged Citizens**: Studies show that students engaged in internships early and often will develop a greater sense of community engagement.
Steps in Developing an Internship

• Planning
  ➢ Site Selection
  ➢ Eligibility and Preparation
  ➢ Financial Aid or Compensation
  ➢ Job Specificity
  ➢ Learning Agreement

• Implementation
  ➢ Supervision
  ➢ Mentoring
  ➢ Communication
  ➢ Reporting
  ➢ Evaluation

• Assessment
Internship Planning

**Site Selection**: Choose a site that provides the student with practical experience in the area of concentration. The site should have personnel who will provide mentoring throughout the internship.

**Student Eligibility and Preparation**: Determine the criteria to qualify for an internship. Students should prepare materials such as resume and cover letter, and should be advised about the credit and evaluation methods used to determine a grade.
Financial Aid: Students should check with their financial aid advisors to determine if they are eligible to receive assistance towards tuition and other expenses. Students should also confirm that their health insurance won’t be affected by the internship. Some internships are compensated by the employer.

Job Specificity: It is important that students know specifically what is expected of them and what they can expect from the experience. Develop milestones or other goals for students to work towards.
Internship Planning (cont.)

**Learning Agreement**: An agreement should be formed between the college, the student, and the field site to identify the specific learning objectives to be attained through the internship. If the internship is to offer academic credit, have this finalized with the college.
Internship Implementation

**Supervision**: Appropriate full-time faculty should be assigned to ensure that learning objectives are met and grading policies are followed.

**Mentoring**: Mentors should spend adequate time with the intern each week to address his/her questions or concerns and to provide guidance.

**Communication**: Throughout the internship, the student and his/her site supervisor should maintain regular contact through any form of media to ensure learning objectives are being met.

**Reporting**: Reports should be delivered to the university from both the site representative and the student. This ensures that expectations are communicated between all related parties.

**Evaluation**: Grading should be based on satisfactory completion of requirements and assignments and the degree to which the learning objectives have been achieved.
Internship Assessment

Continuous Improvement: The PSM program coordinator should implement regular, periodic assessments to determine the program’s effectiveness in meeting learning objectives and to ensure continuous improvement.

Summative Evaluation:

- The student should submit reports regularly to represent the overall value of the internship experience. Upon completion, the student should submit a comprehensive evaluation of the internship experience.
- The mentor/site supervisor at the work site should also provide an assessment of the PSM intern’s performance in meeting the goals of the learning agreement.
- The faculty advisor should aggregate all evaluative reports from the student and the site supervisor and determine a final evaluation based on published criteria and the goals of the student learning contract.
**Top Concerns of an Intern**

**Give Me Real Work**: Interns are excited to work and learn. Don’t be afraid to give them “real work”.

**Do What You Say, Say What You Do**: Be open and honest with your interns so they know what to expected and what is to be expected of them.

**I Like Feedback**: Use mistakes as opportunities to teach. Provide support and guidance for how an intern can handle situations differently.

**I Want to Be Included**: Include interns in office events such as staff meetings, projects meetings, office lunches, and socials.

**Please Explain**: Take the extra few minutes at the beginning of a project or assignment to give a detailed explanation of the work. This will allow the intern to work independently and will pay off dividends as the work grows.
The option of a PSM co-op experience.
What is a co-op placement?

Cooperative Education Programs are educational programs where students can get **HANDS-ON EXPERIENCE** in their field of study through working in a professional environment.

In Co-op, students enter a **PARTNERSHIP** with the school and an employer to gain practical experience relevant to their major.

Full-time, **PAID EMPLOYMENT** lasting as long as **SIX MONTHS**

Non-credit bearing educational program; students pay no tuition.

Students' participation in Co-op is an **INTEGRATED LEARNING EXPERIENCE** that enhances both their studies and career development.

Co-op programs support the students’ endeavor with a **VARIETY OF RESOURCES** preparing them for interviews, showing them what to expect on the job, and drawing on their workplace and classroom experience to achieve their goals.
Benefits of Co-Op

**LEARN** to integrate classroom study with real-world experience.

**EXPERIENCE** professional job opportunities in your major in a six month period.

**DEVELOP** your resume, etiquette techniques, and interview skills.

**EARN** a competitive wage as determined by the Co-op employer.

**SAVE** more and borrow less toward your college education.

**ACHIEVE** employment offering in your field of study after graduation.
Co-Op vs. Internship

Co-Op
• Work two or more terms (alternate with school term), each as long as 6 months
• Full-time, paid, non-credit bearing, no tuition
• Work on projects more intensively
• Students frequently start with higher salaries and with higher levels of responsibility (compared to internships)
• Higher percent of job offers after graduation

Internship
• Typically one work term related to a student's major or career goal
• Lasts about 10-12 weeks during spring, fall or summer semesters
• Credit bearing, scheduled with classes
• Can be full-time or part-time
• Can be paid or unpaid.
How Do Co-Ops Benefit Students?

• Longer work experience

• Explore and confirm your major and career options early

• Develop job search and interview skills

• Develop a network of professional contacts

• Get great job experience for your resume

• Increase your job prospects
How Do Co-Ops Benefit Employers?

• Co-op students are among the brightest and best prepared

• Helps employers find the best qualified employees

• Many employers do their primary hiring from co-ops

• Facilitates Human Resource needs for employers

• Reduces the cost of hiring and training

• Provides longer work term than typical internship

• Helps to retrain talent in the region
PSM Resources.
Main PSM Site
http://www.sciencemasters.com

National PSM Association
http://www.npsma.org/

SUNY PSM
http://www.psm.suny.edu

Council of Graduate Schools
http://cgsnet.org

Keck Graduate Institute
http://www.kgi.edu
Contact Information

Dr. David King
Director, SUNY PSM Consortium
Dean of Graduate Studies and Research
SUNY Oswego
Oswego, NY 13126
David.King@oswego.edu
(315) 312-3152

http://www.psm.suny.edu