

Illinois PSM. Launching Fall 2009.

Science *plus* Business

**PSM INFO FORUM
FOR FACULTY AND STAFF
Thursday, July 24, 2008**

psm.illinois.edu
PSMdegree@illinois.edu



**ILLINOIS
PROFESSIONAL SCIENCE MASTER'S**



Development of the Illinois PSM
is funded by a grant from the
Alfred P. Sloan Foundation

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Evaluation Forms

*This event is sponsored by the Graduate College
and by the Alfred P. Sloan Foundation.*



Agenda

Noon Registration and Lunch

12:30 p.m. – 1:30 p.m. Plenary

Introducing the Illinois PSM

Moderator: Kelly Tappenden, associate dean, Graduate College

- Welcome and Opening Comments
Kelly Tappenden, associate dean, Graduate College
- Professional Science Master's and the Future of Graduate Education
Richard Wheeler, dean, Graduate College
- Creating the Illinois Professional Science Master's
Kevin Sightler, director, Illinois PSM
- The PSM Choice for Bioenergy
Hans Blaschek, director, Center for Applied BioEnergy Research

1:45 p.m. – 2:30 p.m. Concurrent Breakouts *(see descriptions next page)*

- PSM Program Development – Room 406
- PSM Implementation – Room 407
- PSM Recruiting and Career Services – Room 317

2:30 p.m. – 3:00 p.m. Reconvene and Report – Room 314B

Facilitator: Betty Barrett, director, The SocioTechnical Systems Program

Closing Remarks: Kelly Tappenden, associate dean, Graduate College



Concurrent Breakout Descriptions

- PSM Program Development | *Room 406*
Facilitator: Kelly Tappenden, associate dean, Graduate College

This session is for those considering the PSM for new or existing M.S. degree programs. Topics include proposals, governance review, assessing demand and sustainability, financial considerations, faculty support, student recruiting, internships, and other topics as determined by participants.

- PSM Implementation | *Room 407*
Facilitator: Kevin Sightler, director, Illinois PSM

This session is for those involved in the already-approved PSM programs launching in fall 2009. Topics include student recruiting, admissions, advising, scheduling, internships, assessment, and other topics as determined by participants.

- PSM Recruiting, Career Services, and Support | *Room 317*
Facilitator: Rebecca Bryant, assistant dean, Graduate College

This session is for those providing academic advising and career and professional development services to PSM students. Topics include educating prospective employers about PSMs, identifying PSM-specific career development needs, student recruitment and retention, helping students plan and execute the internship search, and other topics as determined by participants.

All breakout groups will reconvene at 2:30 p.m. in room 314B.

Creating the Illinois Professional Science Master's

Context

- Partners:
 - Alfred P. Sloan Foundation <http://www.sloan.org/main.shtml>
 - Council of Graduate Schools <http://www.cgsnet.org/>
 - National Professional Science Master's Association <http://www.npsma.org/>
- Status of PSM programs nationally
- 2007 America COMPETES (Creating Opportunities to Meaningfully Promote Excellence in Technology, Education and Science) Act
- National Research Council (NRC) position – July 2008

The Illinois PSM: Development + Implementation

- Inaugural programs (all pending approval)
 - Agricultural Production
 - Bioenergy
 - Food Science + Human Nutrition
 - *Technical Systems Management*
- Centrally administered, self-supporting, and sustainable – A national model
- Common curriculum for the business-related–“Plus”–curriculum

- “Plus” curriculum delivered by full-time faculty; not simply an adjunct component of the curriculum
 - Cross-disciplinary industry seminar series
 - Sociotechnical Systems integration – Institute of Labor and Industrial Relations
 - Three semester cohorts; fall entry
 - Four curricular components (42 hours total):
 - Science – 32 hours
 - Business – 10 hours
 - Internship – 0 hours
 - Industry Seminar Series (S/U) – 0 hours
 - Financial model
 - Admissions handled through existing processes
 - Individual programs determine admission standards, make selection decisions, determine internship parameters
 - Preparation for securing internships – students and career services
 - Promotion plan for 2008-2009
 - Seminar integration across programs
 - Live / Learn community
-

Growth + Development

- First phase: 2009 - 2011
- Expand number and type of programs
- Continuous improvement
- Flexibility in “Plus” curriculum
- Explore expansion or reorientation for delivery to working professionals



Breakout: PSM Program Development

This session is for those considering the PSM for new or existing M.S. degree programs.

Possible Items
for Discussion:

Assessing demand
Faculty support
Governance review
Proposal development

Assessing sustainability
Finances
Internships
Student recruiting

Question: What do you need to know, and what needs to be done, to start a PSM in your discipline?

	Need:	From Whom / By Whom?
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Prioritize the top five and report back to all attendees at 2:30 p.m. in room 314B.



Breakout: PSM Implementation

This session is for those involved in the already-approved PSM programs launching in fall 2009: agricultural production, bioenergy, and food science and human nutrition.

Possible Items
for Discussion:

Admissions
Assessment
Student recruiting
Financial aid

Advising
Internships
Scheduling (“Plus” courses
& industry seminar)

Question: What needs to happen to successfully implement the first PSM programs in fall 2009?

	To happen:	By Whom?
1.		
2.		
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6.		
7.		
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10.		

Prioritize the top five and report back to all attendees at 2:30 p.m. in room 314B.

Breakout: PSM Recruiting and Career Services

This session is for those providing academic advising and career and professional development services to PSM students.

Possible Items
for Discussion:

Educating prospective employers about the PSM
PSM-specific career services needs
Student Recruitment and retention
Helping students prepare & execute internship searches

Question: What do you need to know, and what needs to be done, to effectively recruit PSM students and to provide them with career and professional development services?

	Need:	From Whom / By Whom?
1.		
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Prioritize the top five and report back to all attendees at 2:30 p.m. in room 314B.



PSM “Plus” Courses

Descriptions of two PSM “Plus” courses are attached as samples. The courses,

- Human Resource Management for Scientists and Engineers, and
- SocioTechnical Systems for Scientists and Engineers,

are delivered by Institute of Labor and Industrial Relations faculty.

Other “Plus” courses will be delivered by the College of Business faculty and are in development.

HUMAN RESOURCE MANAGEMENT FOR SCIENTISTS AND ENGINEERS

Course for the Professional Science Master's Program

Course Description:

The purpose of this course is to provide students in professional science and engineering degree programs a comprehensive foundation of the basic issues surrounding human resources management. As science and engineering graduates enter the workforce and are confronted with organizational configurations that require teamwork, collaborative decision making and problem solving, and leading and managing a diverse workforce, there is a need to help these students build a basic framework of knowledge and skills surrounding human resources and how to motivate, manage, and lead employees in their technical roles. Additionally, employers are also increasingly seeking a mix of technical and people management skills in the graduates they hire.

The course will cover a separate topic in each of its sessions pertaining to human resources management concepts and issues. The course will be based on a model of discussion and group learning focused around case studies and group activities. Ideally, this format will be suitable for class sizes of no more than 30 students. The proposed components of the course will include conceptual as well as practitioner oriented readings, relevant cases, in-class exercises and group work, educational videos, brief assignments, in-class handouts, and resource lists for each topic identifying important readings and sources of further information.

Course Goals:

- Help students develop a sound understanding of some of the basic principles of human resources management.
- Help students learn how to identify human resources issues and challenges in their capacities as scientific/engineering technical supervisors, managers, and team members.
- Help students develop basic tools for dealing with these issues and challenges.

Proposed Outline of Topics and Content:

Session	Topic	Representative Content (not finalized)
1	Stakeholder Alignment and Understanding the Role of the Technical Manager	<ul style="list-style-type: none">• Organizational stakeholders• Alignment issues• Role of technical manager• Human resources as an issue• Legal, ethical, environmental constraints
2	Employee Retention and Growth	<ul style="list-style-type: none">• Recruitment• Selection• Placement• Training• Employee development• Career transitions
3	Workforce Management	<ul style="list-style-type: none">• Staffing• Planning• Delegating• Managing multiple roles
4	Teamwork	<ul style="list-style-type: none">• Diagnosing team usefulness• Building teams and teamwork• Issues related to working in teams
5	Incentive Systems	<ul style="list-style-type: none">• Rewards• Intrinsic/extrinsic motivation• Equity• Justice
6	Performance Management	<ul style="list-style-type: none">• Appraising employee performance• Performance problems• Creativity and Innovation
7	Conflict Management	<ul style="list-style-type: none">• Sources of conflict• Strategies for dealing with conflict• Labor/union – management relations
8	Capstone Session	<ul style="list-style-type: none">• Organizational strategy• Changing organizational environment• Role of technical manager given these constraints• Other issues – to be decided

Contact Information:

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217-265-0952

SocioTechnical Systems for Engineers and Scientists

Course overview and objectives:

This half-semester course is focused at the intersection of social and technical systems in the context of historical and contemporary systems; production, social, biological, industrial, and infrastructural. Understanding this intersection or point at which innovation is implemented is a critical value-add in today's dynamic business world. The course readings will trace the course of change from craft production to mass production to knowledge-driven work systems. Early sociotechnical systems experiments from the 1950s through the 1970s are examined, along with consideration of the implications for complex engineered systems and today's accelerating rate of technological change.

Systems thinking, systems architecture, and related systems principles will be introduced as a framework for analysis while a range of systems change initiatives will be introduced, such as lean production, six sigma, innovation networks, and others, illustrating their applications in different domains. Classes will feature a mix of case studies, class debates, lectures, and guest speaker presentations. Assessment will be based on short papers, active class participation, and a system analysis project..

Important themes include:

- sociotechnical theory
- systems thinking and theory
- collaboration theories
- workplace as a system
- the embedded nature of culture and technology
- technological literacy

Course Goals:

The class will provide the students an opportunity to explore through a systems lens the intersection/interface of the social and technical aspects of the workplace.

Students will acquire a thorough understanding of the interdependencies of a sociotechnical system and will be able to use this knowledge to analyze systems they encounter during their work lives.

The course will provide the participants with a better understanding of the contributions of others in their workplace with different skill sets and expertise.

Students will acquire a new set of tools and techniques to address challenging issues such as technological innovation and multicultural and multidisciplinary interaction in the workplace.

Brief Outline of Topics and Content for basic STS course for engineers and scientists

Session	Topic	Representative Content
1	Why are sociotechnical systems important to you?	<ul style="list-style-type: none"> • Evolution of sociotechnical systems • Analysis of San Francisco's 311 system • Cultural differences between engineers, scientists and others
2	What theory must you know to understand the foundations of sociotechnical systems ?	<ul style="list-style-type: none"> • Theoretical principles of STS • Systems thinking • Early work organization at Ford and Hawthorne • Analysis of a sociotechnical system
3	How do I use knowledge of work organization systems?	<ul style="list-style-type: none"> • Technology and organizational culture • Evolution of work organization systems
4	How does the development of a technology change my work?	<ul style="list-style-type: none"> • Negotiating for technology • Tracing the course of technological change
5	How do I analyze the systems around me?	<ul style="list-style-type: none"> • New systems, new structures, new work organization • Skills needed, skill changes, • Technological change and my workplace
6	How will knowledge of sociotechnical systems help me implement change and innovation?	<ul style="list-style-type: none"> • Participative work • Collaboration • Multi-functionality
7	What is the future of sociotechnical systems?	<ul style="list-style-type: none"> • The future - today and tomorrow
8	Poster session: Present your system analysis to your peers and faculties	<ul style="list-style-type: none"> • Class period dedicated to student presentations

Contact information

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PSM in the Press*Attached:*

The first three articles listed below as "Attached" have been removed from this electronic version because of copyrights. Articles may be accessed using the links below or by contacting Kevin Sightler (sightler@illinois.edu, 217.333.6715).

Masters of Industry: Professional Science Master's Programs Take Root

Chemical and Engineering News

June 16, 2008

Volume 86, Number 24, pp. 65-71

<http://pubs.acs.org/cen/education/86/8624education.html>

Professional Science Master's Programs as Change Agents in Graduate Education

Communicator (A newsletter of the Council of Graduate Schools)

November 2007

Volume 40, Number 9, pp. 4-5

<http://www.cgsnet.org>

National Research Council Supports Professional Master's Degrees

The Chronicle of Higher Education

July 14, 2008

<http://chronicle.com/daily/2008/07/3785n.htm>

National Professional Science Master's Association News & Updates
(newsletter).

July 18, 2008

Volume 1, Issue 9

<http://www.npsma.org/>

See also:

Business Students Should Learn More About Science. The Chronicle of Higher Education, May 16, 2008,

<http://chronicle.com/weekly/v54/i36/36a03501.htm>

(Continued...)

Mastering the Job Market. Science, March 7, 2008,
[http://sciencecareers.sciencemag.org/career_development/
previous_issues/articles/2008_03_07/career_a0800033](http://sciencecareers.sciencemag.org/career_development/previous_issues/articles/2008_03_07/career_a0800033)

Area Schools Heed Science Industry's Warning. Washington Post, January 28,
2008, [http://www.washingtonpost.com/wp-
dyn/content/article/2008/01/27/AR2008012701914_pf.html](http://www.washingtonpost.com/wp-dyn/content/article/2008/01/27/AR2008012701914_pf.html)

Science for a new age. Insider Higher Ed, July 14, 2008,
<http://insidehighered.com/news/2008/07/14/masters>

Engineering for a Changing World: A Roadmap to the Future of Engineering
Practice, Research, and Education. 2008 Report The Millennium Project,
University of Michigan, by James J. Duderstadt, President Emeritus and
University Professor of Science and Engineering, The University of
Michigan. <http://milproj.dc.umich.edu/>



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“Taken for Granted over Here”, Beryl Lief Benderly, *Science Careers*, June 6, 2008 (excerpt)

“The Maryland program will graduate its first class next year, and program director Rana Khan expects good employment prospects. ‘I think there is a lot of interest,’ she says.”

Science Careers,
June 6, 2008

But traditional grad school is no longer the only--or, in many cases, the best--route into careers using science or technical skills. Professional science master's (PSM) degree programs, which open lucrative opportunities in the applied aspects of scientific and technological fields, are sprouting across the country. These 2-year terminal programs for students who already have a bachelor's degree do not generally provide the fellowships or assistantships that pay most people's way through traditional, Ph.D.-focused grad programs, but enhanced GI benefits could cover those costs if the bill becomes law, as it may within the next couple of weeks. Financial aid is also available.

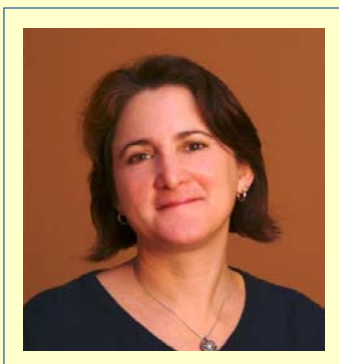
A professional master's in a field related to national or homeland security could therefore be just the ticket for the veteran wanting to work in applied areas of science. Apart from a large number of PSM programs with foci relevant to national security topics, there currently are two PSMs dedicated to specifically defense-related topics: the Air Force Institute of Technology's "Combating Weapons of Mass Destruction" and the University of Maryland, University College's "Biosecurity and Biodefense."

NPSMA Annual Conference Workshop Topics Outlined

The NPSMA 2008 Annual Conference will be held on Thursday, November 13 and Friday, November 14 at the Georgia Tech Hotel and Conference Center in Atlanta. Included in the event will be a series of interactive workshops designed to encourage the sharing of strategies, successes, and lessons learned while developing and sustaining PSM degree programs.

The workshop topics will focus on curriculum concerns, engaging employers, student and alumni issues, media relations for PSM's, and programs in entrepreneurship.

Details pertaining to conference networking opportunities, keynote speakers, and general session content will be announced in the coming weeks.



*Elizabeth Friedman,
Conference Planning
Committee Member*

“Staying Competitive”, Heather Chikoore, State Legislatures, June 2008 (excerpt)

Imagine an employee with a master’s degree in biotechnology who is also trained to negotiate with the Food and Drug Administration, work on a patent law team and lobby Congress. Or someone who has a master’s in forensic science and whose skills qualify her to lead teams of people and communicate complex information to the public. How do math and science students gain deep scientific knowledge and the business skills needed by today’s scientific and technological industries? Many believe the professional science master’s (PSM) degree is the answer.

Increasingly, businesses are seeking employees with skills in a STEM (science, technology, engineering and mathematics) subject who also have skills required for business, communication, policy or leadership. Some of the fastest-growing and highest-paying jobs require scientific or mathematical prowess and the ability to apply that knowledge in a real-world setting.

The professional science master’s degree is designed to allow graduate students to pursue advanced training in science or mathematics, while also developing skills highly valued by employers. Programs consist of two years of academic training along with a professional component that may include internships and “cross-training” in business and communications.

(Representative Winckler) says the five PSM degrees offered at University of Northern Iowa, ranging from biotechnology to ecosystem management, are designed to meet the needs of Iowa businesses and industry. Students see science and math concepts implemented in a real-world setting through internships. “These are graduate students who are receiving high-paying jobs, often in Iowa, when they graduate,” she says.

Many Offer Their Perspectives on the Benefits of the PSM Degree

“In today’s knowledge economy, professional science masters degree programs have a critical role to play in keeping America competitive by creating linkages between institutions and industry to prepare scientists with the practical training they need to work in high-need fields.”

- Sen. Edward M. Kennedy (D-MA)

“These skills are absolutely necessary to compete in today’s global workforce and go far beyond what a student learns with a traditional research degree. It is very clear from the businesses, industries, non-profit and government agencies employing PSM graduates that this degree readily satisfies current workplace demands.”

- Elizabeth Friedman, Illinois Institute of Technology

“If the country needs more scientists to spur economic growth, this is a great way to get them. The programs graduate people who know enough science to do useful things in theory, but who also know enough about navigating companies to actually accomplish things in practice.”

- Geoff Davis, Sr. Quantitative Analyst, Google

“It’s very important that Iowa keep highly skilled graduates in the state, rather than offering students an excellent education then discovering they go out of state for employment.”

Iowa Representative Cindy Winckler

“For once I know what employers want and that I am sure to get it if I get a PSM.”

Bill Terilla,
Prospective PSM
Student

NPSMA Encourages PSM Program Directors to Submit Their Promotional Material



*Stephen Lemire,
NPSMA Executive Director*

The NPSMA is compiling promotional material from all existing PSM degree programs. The NPSMA is using this material to create a master presentation about PSM degree offerings to be used at career fairs, tradeshow, and to be posted at the NPSMA office.

Also, the NPSMA hopes to be able to have enough examples on hand that information may be sent directly to prospective students who contact the NPSMA office about PSM degrees and their possible choices.

If interested, please ship 25 copies of your flyers to: NPSMA, 100 Institute Road, Worcester, MA 01609. If you would like to submit your material electronically, you may send it to slemire@npsma.org.

House Celebrates Women Scientists, Technologists, Engineers, and Mathematicians

On June 4, the House approved, by voice vote, a resolution (H. Res. 1180) recognizing the efforts of outstanding women scientists, technologists, engineers, and mathematicians in the United States and around the world.

Sponsored by Rep. Dave Reichert (R-WA), the resolution contains a number of findings, including:

- women have been vitally important to the fields of science, technology, engineering, and mathematics, and have transformed the world and enhanced and improved the quality of life around the globe;
- the contributions of women and mothers are central to progress and to the development of knowledge in many areas, including chemistry, physics, biology, geology, engineering, mathematics, and astronomy, and these contributions boost economic growth, create new jobs, and improve our knowledge and standard of living;
- in order to ensure our nation's global competitiveness, our schools must continue to cultivate female scientists, technologists, engineers, and mathematicians from every background and neighborhood in our society to create the innovations of tomorrow that will keep our nation strong;
- and a disproportionately low number of female students are pursuing careers in science, technology, engineering, and mathematics, and it is crucial that we focus attention on increasing the participation of women.

NPSMA

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PSM Programs Nationally

There are 121 PSM programs at 60 institutions in the U.S.

PSM Programs at Illinois’s Peer Institutions

Michigan State University
 Biomedical Laboratory Operations
 Computational Chemistry
 Food Safety and Toxicology
 Industrial Mathematics
 Industrial Microbiology
 Integrative Pharmacology
 Zoo and Aquarium Management

New York University
 Physics
Pennsylvania State University
 Applied Statistics
 Forensic Science
 Biotechnology

Sampling of Other PSM Programs

Applied and Industrial Physics *University of Arizona*
 Biomedical Informatics *Stanford University*
 Business of Bioscience *Keck Graduate Institute of Applied Life Sciences*
 Financial Mathematics *North Carolina State University*
 Geographical Information Systems *University of Pittsburgh*
 Human-Computer Interaction *Georgia Institute of Technology*
 Nanoscience *Arizona State University*
 Prosthetics and Orthotics *Georgia Institute of Technology*
 Subsurface Geosciences *Rice University*

For complete list of currently offered PSM programs, visit the Council of Graduate Schools’ Professional Science Master’s Web site (<http://www.sciencemasters.com>)



Follow-Up



Please contact me. I would like to talk further about the Illinois PSM.

Name: _____

Department or College: _____

Address: _____

e-mail: _____

Phone: _____

Questions, comments, or
items for discussion:

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Forum.*

Science
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