Online Pharmacology Graduate Programs:
An experiment in Progress

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For more information:

http://www.phmtox.msu.edu/education/online/index.html
The Need:

- **Established need for training programs in Integrative Pharmacology**
  - 2004 - NIH, NIGMS RFA “Short Course: Integrative and Organ Systems Pharmacology”.

- **Fewer opportunities for non-Ph.D., post-baccalaureate training in Integrative Pharmacology, particularly for individuals already employed in industry, government and academic labs.**
What’s a Professional Science Master’s Degree?
PSM Programs:

- Are two year, terminal, graduate degree programs.
- Combine:
  - rigorous study of science or math with
  - skills-based “professional” course-work in management, policy or law.
- Most emphasize:
  - writing and
  - communication skills.
- Generally require:
  - a final project or team experience
  - a “real-world” experience in a business or public sector enterprise.
- Are developed in concert with industry, usually through an Advisory Board.
PSM Programs:

• Started in 1997
  – 14 grants from the Alfred P. Sloan foundation programs in the natural sciences and mathematics, and
  – 12 for bioinformatics programs at research institutions.

• Extended to more institutions in 2001, when the Council of Graduate Studies (CGS) partnered with the Sloan foundation.

• Received further support in 2006 when the CGS assumed primary responsibility for supporting and expanding the Sloan PSM Initiative.

• Can be found at more than 130 Universities where there are more than 297 PSM programs.

http://www.scencemasters.com/
Goals of MSU’s PSM in Integrative Pharmacology:

• Train individuals in integrative pharmacology and use of animal models for careers in industry, government and academic labs.

• Design program such that individuals already employed could complete the program while remaining on the job.

• Generate an alternative revenue stream for Department.

• Maintain research-intensive focus of the Department
Initial Outline of MSU’s PSM in Integrative Pharmacology:

- Two year program consisting of:
  - On-line courses.
  - Intensive, hands-on, Applied Integrative Pharmacology Lab on campus (Branding experience).
  - On-the-job knowledge application.
  - Final project and report.
Advisory Board:

- Steven Humphreys - PharmOptima LLC
- David G. Pegg, Ph.D., D.A.B.T. - formerly with Pfizer
- Lewis Kinter, Ph.D. - AstraZeneca Pharmaceuticals
- Bryan F. Cox, Ph.D. - Abbott Laboratories
Working Curriculum – Fall 2006

• **Required courses**
  - PHM 819 - Principles of Drug-Tissue interactions
  - PHM 830 - Experimental Design & Data Analysis
  - PHM 832 - Applied Integrative Pharmacology Lab (seven-day on-campus experience)
  - PHM 895 - Applied Project in Integrative Pharmacology

• **Science electives (12 credits or more)**
  - PHM 350 - Introduction to Human Pharmacology
  - PHM 450 - Introduction to Toxicology
  - PHM 813 - Cardiovascular Pharmacology
  - PHM 829 - Neuropharmacology
  - PHM 831 - Endocrine Pharmacology
  - PHM 833 - Gastrointestinal & Liver Pharmacology
  - PHM 834 - Respiratory Pharmacology
  - MT 830 - Concepts in Molecular Biology
  - VM 812 - Food Safety Toxicology

• **Professional electives (6 credits or more)**
  - PHM 851 - Intellectual Property & Patent Law
  - PHM 854 - Leadership & Team-Building for Researchers
  - PHM 857 - Introduction to Project Management
  - PHM 858 - Project Management & Drug Development
  - MT 842 - Managing Biomedical Laboratory Operations
Working Curriculum - Today

• Required courses
  – PHM 819 - Principles of Drug-Tissue interactions
  – PHM 830 - Experimental Design & Data Analysis
  – PHM 832 - Applied Integrative Pharmacology Lab (5-day on-campus experience)
  – PHM 895 - Applied Project in Integrative Pharmacology

• Science electives (12 credits or more)
  – PHM 430 - Human Pharmacology
  – PHM 450 - Introduction to Chemical Toxicology
  – PHM 813 - Cardiovascular Pharmacology
  – PHM 817 – Neurotoxicology
  – PHM 822 - Academic & Research Integrity
  – PHM 828 - Concepts in Carcinogenesis
  – PHM 829 - Neuropharmacology
  – PHM 831 - Endocrine Pharmacology
  – PHM 833 - Gastrointestinal & Liver Pharmacology
  – PHM 834 - Respiratory Pharmacology
  – PHM 835 – Biopharmaceuticals
  – PHM 837 - Autonomic Pharmacology
  – PHM 840 – Safety Pharmacology
  – PHM 841 – Cellular and Molecular Toxicology
  – MT 830 - Concepts in Molecular Biology
  – VM 812 - Food Safety Toxicology

• Professional electives (6 credits or more)
  – PHM 659 – Regulatory Affairs and Project Management in Clinical Research
  – PHM 850 – Communications for Biomed Res
  – PHM 854 - Leadership & Team-Building for Researchers
  – PHM 855 - Business of Biomed Res Orgs
  – PHM 857 - Introduction to Project Management
  – PHM 858 - Drug Development Process
  – MT 842 - Managing Biomedical Laboratory Operations
Startup Challenges:

• Who would design, implement and teach the on-line courses?
• How would we fund the program?
• Marketing.
• Is there enough demand?
Who designed, implemented and teaches the on-line courses?

- **Design and Teaching:**
  - Existing faculty (12 courses)
  - Former students/postdocs (6 courses)
  - Other part-time faculty (4 courses)

- **Implementation:**
  - Educational Coordinator
  - In-house producer
  - University-supplied producers
How did we fund the program?

- **Seed money from MSU for the first 3 years:**
  - Faculty line
  - Educational Coordinator
  - In-house producer
- **Revenue sharing from:**
  - large undergraduate on-line pharmacology course
  - new on-line courses
- **NIGMS grant for Integrative Pharmacology Short Course:**
  - Provided funds to equip hand-on lab and gain experience with an Integrative Pharmacology lab.
- **Student Fees** – Pay for supplies for lab course
Marketing:

• Word of Mouth.

• Web-presence.
  – Web page
  – Social Media

• Other Modes not yet used:
  – Cross-listing with other Universities.
  – Trade shows.
  – Direct marketing - visit industries.
  – Direct-mail marketing (expensive!)
Is there enough demand?

• We think so, based on:
  – Input from Advisory Board and other colleagues in industry.
  – Inquiries about the program.
  – Student demand for offerings of on-line courses.
  – Continuous stream of applications 4-8 per semester

• We’re in the middle of the experiment,
  – Time will tell!
Where are we today:

• Graduated 29 PSM students, 24 students currently enrolled.
• Spun off a new MS in Pharmacology and Toxicology in 2009 – currently have 148 enrolled and graduated 33.
• Spun off a Graduate Certificate Program in Safety Pharmacology in late 2012 – 1 student
• Financially independent
Advantages of online Programs:

• Allows students to “work” full-time and still take classes.
• Student centered education – promotes independent learning.
• Modular nature provides flexibility and ability to change courses to meet student demands, and for multi-use.
Challenges of Online Programs:

• Obtaining/maintaining faculty buy-in.
• Startup costs – time and actual $$$.
• Designing interactivity into courses.
  – Understanding what students don’t understand.
  – Incorporating interactivity.
• Managing part-time faculty.
• Maintaining the revenue stream in the face of University financial pressures.
• Assessment.
The future: Hybrid Courses

• The best of both worlds!
• Excellent use of faculty and student time.
• Biggest “danger” is trying to include too much in the online segment and to not integrate the online material with face-to-face.
For more information:

http://www.phmtox.msu.edu/education/online/index.html
Characteristics of PSM programs:

- Two year interdisciplinary programs
- Close association with Industry
- > 50% of course work in Sciences.
- Inclusion of “Professional” Courses:
  - Business fundamentals, Finance and Marketing, Project Management, Communications, Team building, etc.
- Internships or other hands-on experience
- Final applied project