

Graduate Faculty Meeting  
Monday December 12, 2006  
Havener Center

The meeting was called to order at 3:00 pm. The first item of business was to approve the list of graduate degree recipients provided by the registrar's office. One name was added to the list by Prof. Krishnamurthy and with this addition the list of graduate degree recipients was approved unanimously.

The second item concerned a recommendation to increase Stipend X for graduate assistants. A motion was made to recommend a 2% increase in Stipend X for the next academic year. The motion was seconded and briefly discussed with some concerns expressed that the percentage increase in Stipend X should not exceed the 0 percentage increase in the GTA budget for departments. Nevertheless, the motion to recommend a 2% increase for next year was approved unanimously.

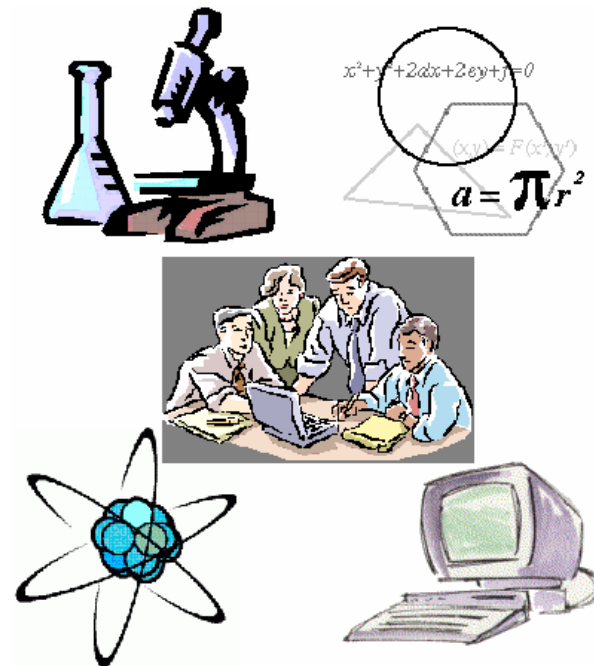
Finally the professional science masters degree was briefly described by Prof. Bill Daughton. A motion to approve this degree program was made, seconded, and approved unanimously. For the record, a description of the proposed program and its justification is attached in Appendix 1 to these minutes. This description was distributed to all graduate faculty members on the email distribution list.

The meeting was adjourned at 3:20 pm.

Respectfully submitted,  
Richard E. DuBroff  
Chairman of the Graduate Faculty

## APPENDIX 1 (Professional Science Masters)

# Proposal for a Professional Science Master's Degree



*A Collaboration among the UMR Departments of  
Biological Sciences, Chemistry, Computer Science,  
Mathematics and Statistics, Physics, Business  
Administration, Information Science and Technology,  
and Engineering Management*

*UMR College of Arts and Sciences*

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## EXECUTIVE SUMMARY

Despite UMR's success in traditional natural science and mathematics education, there are educational needs in today's workforce that are not adequately being met, and which provide opportunities to expand our educational mission. A **Professional Science Master's (PSM) Degree Program** can fill an unmet need to provide a post-baccalaureate level integration of study in the natural sciences and mathematics with knowledge and training in management, law, and other professional domains.

Currently very few PSM degree programs are offered in the Midwest United States. According to a PSM market interest survey recently conducted by the UMR's Department of Engineering Management and Systems Engineering, 53% of UMR alumni and 45% of current UMR students pursuing undergraduate science and mathematics degrees who were surveyed were not at all familiar with PSM degree criteria. However, upon learning more about the PSM degree, there was a significant interest in such a program, as reflected in the following results of those surveyed:

- 96% of current students and 74% of alumni plan to pursue graduate education
- 77% of current students and 63% of alumni said they would be more likely to choose a PSM over a higher level degree in their field of study
- 83% of current students and 63% of alumni said they would be more likely to choose a PSM over an MBA
- 92% of current students and 79% of alumni felt that a PSM degree would be valuable to their career

Also identified in this survey was a considerable interest in the PSM courses being offered via Distance Education.

Herein we propose a **Professional Science Master's Degree Program to be offered through the UMR College of Arts and Sciences**. Many of the resources necessary to initiate this program are already in place, including existing courses in science, technology, and management, qualified faculty and support staff, and Distance Education facilities.

Projected enrollment in the program by Year 5 is approximately 30, with about 5 students graduating per year. This is a reasonable projection given the results of the aforementioned market interest survey and current graduate student enrollment in each of the participating departments. **Financial investment in this program will be modest** (no more than \$15-25k per year to advertise and promote the program; to develop additional Distance Education opportunities in graduate science and business coursework; to create lab opportunities for our Distance PSM students in the form of intense weekend short courses; to support a series of web-accessible colloquia for the PSM students; and to fund scholarships for our first class of on-campus PSM students). **Substantial revenues (> \$170k) can be expected by Year 5.**

**1. NEW PROGRAM PROPOSAL FORM**

**Form NP**

Sponsoring Institution(s): University of Missouri-Rolla

College of Arts and Sciences

Program Title: Professional Science Master's Degree

Degree/Certificate: Professional Science Master's Degree

Options: \_\_\_\_\_

\_\_\_\_\_

Delivery Site(s): University of Missouri-Rolla

CIP Classification: 26.1103 (Please provide a CIP code)

Implementation Date: August 2007

Cooperative Partners: \_\_\_\_\_

Expected Date of First Graduation: May 2009

**AUTHORIZATION**

\_\_\_\_\_  
Name/Title of Institutional Officer                      Signature                      Date

\_\_\_\_\_  
Person to Contact for More Information    Telephone

## 2. PROGRAM NEED

- 2.1. **Student Demand:** Enrollment for the first class of candidates is projected to be 5 students. This number is based on an estimation of 10% of the average number of graduate students in each of the participating departments. As the number of students that successfully complete the program grows, enrollment in the program is expected to increase, with approximately 30 students entering the program by Year 5.

### FORM SE: STUDENT ENROLLMENT PROJECTIONS

Year	1	2	3	4	5
<b>Student Distribution</b>	3 DE 2 OC	6 DE 4 OC	9 DE 6 OC	15 DE 10 OC	18 DE 12 OC
<b>Total # Students</b>	5	10	15	25	30

DE = Distance Ed

OC = On-campus

It is assumed that students making use of the Distance Education option will likely be employed while pursuing the PSM degree, and, thus, will be enrolled part-time. On-campus students are assumed to be full-time.

- 2.2. **Market Demand:** *USA Today* (<http://www.usatoday.com/educate/college/careers/hottopic3.htm>. July 2004) calls the PSM degree “the MBA for scientists and mathematicians. ...an education aimed at future managers who will be able to move comfortably in the business of science, from a meeting about enzymes to another about intellectual property rights, all the while understanding the goal is not a scientific journal article but marketable products. ...Experts predict it will become the 21st century’s fastest ticket to the major leagues in business and government.”

The same *USA Today* article includes the following opinions from industry experts regarding the market demand for the PSM degree.



*Philip Tuchinsky, a project manager at Ford Motor who has a Ph.D. in mathematics, is very familiar with PSM degrees offered at Michigan State. Although Ford has not been hiring, he predicts PSM graduates will soon be in high demand. He thinks **they will make significant contributions to Ford and provide a competitive edge to U.S. industry in general.***

*Small companies may have the most need for PSM grads. Biotech jobs alone will grow by 3 million from 2000 to 2010, according to Assistant Labor Secretary Emily Stover DeRocco. **Small start-ups need math-science-business expertise**, as do venture capitalists trying to spot companies with ideas that can be turned into earnings and regulators trying to be watchdogs.*

***The PSM should increase a worker's credibility**, says Sheila Tobias, a science education consultant and author of *Rethinking Science as a Career*. She says the master's is **attractive to women who prefer to have a career up and running before they're 30.***

*The students that we turn out are not future cubicle rats, but future project managers," says Charles MacCluer, director of Michigan State's PSM program in industrial mathematics. "Business is getting too scientific to be managed by businessmen," he says. **"They need a new hybrid, a scientifically trained person."***

According to a PSM market interest survey recently conducted by the UMR's Department of Engineering Management and Systems Engineering, local companies such as Monsanto in St. Louis echo these sentiments, expressing interest in hiring new employees with PSM degrees and allowing current employees to pursue PSM degrees.

- 2.3. Societal Need:** A PSM degree program would help UMR play a key role in providing individuals with math-science-business expertise in the scientific technology markets of St. Louis and Kansas City. The potential contributions that these graduates could make to the growing biotechnological industry could ultimately result in improved public education, health, and economic well-being for all Missourians.

**2.4. Methodology:** The basis for the content above comes from related literature, secondary data sources, internet searches, personal communication with industry and academic leaders, and market trends.

**3. DUPLICATION AND COLLABORATION: If similar programs currently exist in Missouri, what makes the proposed program necessary and/or distinct from the others at public institutions, area vocational technical schools, and private career schools?**

There are currently nearly 100 PSM degree programs in 24 states and the District of Columbia. Table 1 lists the PSM degree programs offered in the Midwest (see

<http://www.sciencemasters.com/regional.php> for a complete list of all PSM programs in the U.S.).

Note that there are currently no PSM programs in the state of Missouri.

<b>Institution</b>	<b>State</b>	<b>PSM Programs</b>
Case Western Reserve	Ohio	Biology/Chemistry/Physics/Mathematics/Statistics for Entrepreneurship
University of Dayton	Ohio	Financial Mathematics
East Michigan University	Michigan	Bioinformatics
Grand Valley State University	Michigan	Bioinformatics, Biotechnology, Biostatistics
Illinois Institute of Technology	Illinois	Materials and Chemical Synthesis, Analytical Chemistry, Health Physics, Biology
Indiana University/Purdue University at Indianapolis	Indiana	Laboratory Informatics
Michigan State University	Michigan	Industrial Microbiology, Industrial Mathematics, Zoo and Aquarium Science Management
University of Michigan	Michigan	Bioinformatics
Southern Illinois University	Illinois	Environmental Risk Management
University of Wisconsin	Wisconsin	Environmental Monitoring, Remote Sensing, Spatial Information Management

**Table 1. PSM Programs in the Midwest United States**

FORM PS

PROGRAM STRUCTURE

**Professional Science Masters**

**A. Total Credits Required for Graduation:**

**30 Credit Hours Minimum**

The proposed program is a Professional Science Masters without thesis. A minimum of 30 credit hours must be completed for graduation.

**B. Residency Requirements**

For Professional Science Masters programs, in courses that have a laboratory component that component must normally be performed on campus. Courses that are available via the Office of Distance and Continuing Education may be taken off-campus.

**C. General Education Prerequisites**

Entering students will be required to have prerequisite skills equivalent to those required for graduate level courses.

**D. Major Requirements**

**12 credit hours business management courses  
18 hours (minimum) major department**

- |   |                               |
|---|-------------------------------|
| <b>1. Business and Engineering Management Courses</b>               | <b><u>12 Credit Hours</u></b> |
| One of each category a through d:                                   |                               |
| a. IST 351 Leadership in Technology-Based Organizations             | 3 Credit Hours                |
| EMGT 314 Management for (Scientists) and Engineers                  |                               |
| b. IST 361 Information Systems Project Management                   | 3 Credit Hours                |
| EMGT 361 Project Management   |                               |
| c. EMGT 352 Activity Based Accounting and Financial Decision Making | 3 Credit Hours                |
| d. EMGT 320 Technical Entrepreneurship                              | 3 Credit Hours                |
| FIN 250 Corporate Finance I   |                               |
| BUS 260 Business Operations   |                               |
| BUS 270 Human Resource Management                                   |                               |
| <br>  |                               |
| <b>2. Major Department</b>  | <b><u>18 Credit Hours</u></b> |
| a. <b>BIOLOGICAL SCIENCES</b>                                       |                               |
| 1. Requirements   |                               |
| a) BIO 4xx Advanced Biochemistry                                    | 3 Credit Hours                |
| b) BIO 4xx Advanced Cell Biology                                    | 3 Credit Hours                |
| c) BIO 4xx Advanced Molecular Genetics                              | 3 Credit Hours                |
| d) BIO 401 Bioinformatics   | 4 Credit Hours                |
| 2. Electives  |                               |
| a) 300-400 level BioSci course                                      | 5 Credit Hours                |

**b. CHEMISTRY**

**1. Requirements**

**A minimum of 9 credit hours**

**a. One of the following:**

**CHEM 436 X-Ray Crystallography  
CHEM 421 Advanced Organic Chemistry  
CHEM 431 Inorganic Reaction Mechanisms  
CHEM 440 The Physical Chemistry of Colloidal Dispersions  
CHEM 451 Advanced Quantitative Analysis  
CHEM 464 Free Radicals in Biochemistry  
CHEM 447 Statistical Thermodynamics**

**b. One of the following:**

**CHEM 432 Bioinorganic Chemistry  
CHEM 423 Advanced Synthetic Organic Chemistry  
CHEM 435 Principles of Inorganic Chemistry  
CHEM 441 Physical Chemistry of Surfaces  
CHEM 453 Separations  
CHEM 465 Enzymology  
CHEM 484 Polymer Physical Chemistry and Analysis**

**c. One of the following:**

**CHEM 425 Physical Organic Chemistry  
CHEM 438 Inorganic Materials Chemistry  
CHEM 443 Advanced Chemical Thermodynamics  
CHEM 455 Chemical Spectroscopy  
CHEM 467 Intermediary Metabolism and Biosynthesis  
CHEM 484 Polymer Physical Chemistry and Analysis  
CHEM 449 Chemical Kinetics  
CHEM 457 Electrochemistry  
CHEM 458 Principles and Applications of Mass Spectrometry  
CHEM 467 Intermediary Metabolism and Biosynthesis  
CHEM 468 Advanced Biochemical Techniques**

**2. Electives**

**a) 300-400 level Chemistry course**

**9 Credit Hours**

**c. COMPUTER SCIENCE**

**1. Requirements**

**a) CS 306: Software Engineering I**

**3 Credit Hours**

**b) CS 307: Software Testing and Quality Assurance**

**3 Credit Hours**

**2. Electives**

**a) 300-400 level Computer Sciences course**

**12 Credit Hours**

**d. FINANCIAL MATHEMATICS**

**1. Requirements**

- a) **MATH 303 Mathematical Modeling** **3 Credit Hours**
- b) **MATH 301 (Financial Mathematics)** **3 Credit Hours**
- c) **STAT 343 Probability and Statistics** **3 Credit Hours**
- d) **One of the following:** **3 Credit hours**
  - MATH 302 Intermediate DE**
  - MATH 309 Adv. Calc I**
  - MATH 315 Intro. to Real Analysis**
  - MATH 325 Partial Differential Equations**
  - MATH 383 Operational Calculus**
  - MATH 408 Applied Matrix Theory, or**
  - MATH 465 Mathematical Programming**
  - IST 301/328 Financial Information Systems**
  - IST 401/428 00 Financial Software**
- e) **One of the following:** **3 Credit hours**
  - STAT 314 Applied Time Series Analysis**
  - STAT 344 Mathematical Statistics**
  - STAT 346 Regression Analysis**
  - STAT 353 Statistical Data Analysis**
  - STAT 438 Industrial Queuing Theory**
  - STAT 441 Stochastic Processes, or**
  - EMGT 480 Investment**
- f) **One of the following:** **3 Credit hours**
  - ECON 315 Mathematical Economics**
  - FIN 350 Corporate Finance II**
  - ECON 323 International Finance**
  - ECON 415 Advanced Mathematical Economics**
  - ECON 421 Advanced Finance**
  - ECON 423 Advanced International Finance, or**
  - EMGT 481 Financial Engineering**

**2. Electives - None**

**e. PHYSICS**

**1. Requirements**

- a) **PHYS 409 Classical Mechanics I** **3 Credit Hours**
- b) **PHYS 421 Electrodynamics I** **3 Credit Hours**
- c) **PHYS 461 Quantum Mechanics I** **3 Credit Hours**

**2. Electives**

- a) **300-400 level Physics course** **6 Credit Hours**
- b) **300-400 level Physics course**  
**or 200-300 level EMGT or BUS** **3 Credit Hours**

**f. STATISTICS**

**1. Requirements**

- a) **STAT 217 Introduction to Probability and Statistics or  
STAT 343 - Probability and Statistics** **3 Credit Hours**
  
- b) **STAT 344 Mathematical Statistics or  
STAT 353 Statistical Data Analysis** **3 Credit Hours**
  
- c) **Four of STAT 314 Applied Time Series Analysis  
STAT 346 Regression Analysis  
STAT 443 Non-Parametric Statistical Methods  
STAT 444 Design and Analysis of Experiments, or  
STAT 470 Theory of Reliability** **12 Credit Hours**

## 4.2. Financial Projections

### 4.2.1. FORM FP

	Year 1	Year 2	Year 3	Year 4	Year 5
<u>1. Expenditures</u>					
A. One-time:					
New/renovated space					
Equipment					
Library					
Consultants					
Other: advertisement	\$5000				
Total for One-time Expenditures	\$5000				
B. Recurring:					
Faculty					
Staff					
Benefits					
Equipment					
Library					
Other-					
1. Distance Ed course development (\$4000 per course; 3 courses per year for Year 1-2, 2 courses per year Year 3-5 )	\$12000	\$12000	\$8000	\$8000	\$8000
2. Develop weekend lab short courses for DE students	\$5000	\$5000	\$5000	\$5000	\$5000
3. Support web-based colloquia for PSM students	\$1500	\$1500	\$1500	\$1500	\$1500
4. Scholarships on-campus students, first three years (\$1000 per student)	\$2000	\$4000	\$6000	---	---
Total for Recurring Expenditures	\$20500	\$22500	\$20500	\$14500	\$14500
TOTAL (A + B)	\$25500	\$22500	\$20500	\$14500	\$14500



<u>2. Revenues</u>					
*State Aid – CBHE					
*State Aid – DESE					
Tuition/Fees					
(# on-campus FT students) @	\$11,850	\$23,700	\$35,550	\$59,250	\$71,100
\$5925/yr)	(2)	(4)	(6)	(10)	(12)
(#DE students) x 0.5 @	\$16,656	\$33,312	\$49,967	\$83,279	\$99,935
\$11104/yr)	(3)	(6)	(9)	(15)	(18)
Institutional/Resources					
Other					
<b>TOTAL REVENUES</b>	<b>\$28,506</b>	<b>\$57,012</b>	<b>\$85,517</b>	<b>\$142,529</b>	<b>\$171,035</b>

#### 4.2.2. Justification of Financial Projections

##### 4.2.2.1. Expenditures

**4.2.2.1.1. Advertising:** Promoting the program in its first year will be critical to its success. Many prospective graduate students are still unaware of the existence of the PSM and its potential benefits. The funds will be used to create a brochure, design a web site, and purchase radio, TV, and newspaper ads in target locations.

**4.2.2.1.2. Distance Education Course Development:** Most of the courses are already in place for this degree program. One critical component however will be to adapt some of these existing on-campus classes to Distance Education in order to meet the needs of a large proportion of the constituency (non-traditional students who remain in the workforce). This will cost approximately \$4000 per class. Two classes per year will be adapted for distance delivery.

**4.2.2.1.3 Lab Short Courses:** A critical aspect of the science courses is the hands-on experience that comes from actual lab work. To allow these PSM students to experience the hands-on aspects of their chosen curricula, weekend lab short courses will be designed and implemented. The estimated cost is \$5000 per year; one such class will be introduced in each of the first 5 years.

**4.2.2.1.4 Web-based Colloquia:** Web-based seminars and colloquia will expand the horizons of the PSM students beyond the classroom lectures into cutting edge research. Departments will be

asked to add several web-based seminars to their seminar series each semester. Estimated cost is \$1500.

**4.2.2.1.5 Scholarships:** To recruit the first classes of quality on-campus PSM students (and convince them to try this new degree program), some scholarship assistance will be required. As the degree grows in stature and becomes well-understood, this can be tapered. An estimate of the cost is a \$1000 scholarship for each on-campus student in each of the first three years—2, 4, and 6 on-campus students respectively, so a total of \$12000 during the first 3 years.

#### **4.2.2.2. Revenues**

**4.2.2.2.1** The number of student FTEs enrolled in the program was calculated from the enrollment projections (page 6); since the distance students are projected to be part time, these numbers were multiplied by 0.5. The number of student FTEs was then multiplied by the amount of in-state tuition generated for on-campus and distance courses.

### 4.3. PROGRAM CHARACTERISTICS AND PERFORMANCE GOALS

#### PROGRAM CHARACTERISTICS AND PERFORMANCE GOALS

##### FORM PG

*Institution Name:* The University of Missouri-Rolla

*Program Name:* Professional Science Masters

*Date:* January 2006

**4.3.1. Student Preparation: Any special admissions procedures or student qualifications required for this program which exceed regular university admissions, standards, e.g., ACT score, completion of core curriculum, portfolio, personal interview, etc. Please note if no special preparation will be required.**

Students seeking admission to the Professional Science Masters program will be required to have an undergraduate degree in a scientific or mathematical program of study from an accredited school. In addition students are expected to have sufficient previous training to satisfy the prerequisites for courses on the candidate's program of study. Any prerequisite courses not on the program of study may be taken at UMR, but will not count toward the Professional Science Masters degree. A maximum of six hours may be transferred from other colleges or Universities. Candidates for admission will be required to take the Graduate Record Examination, and to meet existing University standards for admission.

**4.3.2. Characteristics of a specific population to be served, if applicable.**

The University of Missouri-Rolla's first goal is to serve the population of Missouri. This program is geared towards producing highly skilled graduates with a post-baccalaureate level of integration in the natural sciences and mathematics, with knowledge and training in management, law, or other professional domains.

### **4.3.3. Faculty characteristics**

#### **4.3.3.1. Any special requirements (degree status, training, etc.) for assignment of teaching for this degree/certificate.**

Faculty participating in this program are expected to be faculty (regular, full-time or adjunct) at the University of Missouri-Rolla at the start of this program. They are expected to have a Ph.D. and should meet the status for Graduate faculty as described by the University of Missouri-Rolla. These should include an active research program, publication of peer-reviewed papers, and some experience in a classroom environment.

#### **4.3.3.2. Estimated percentage of credit hours that will be assigned to full-time faculty. Please use the term "full-time faculty" (and not FTE) in your descriptions here.**

We anticipate that approximately 80% of courses will be taught by full time faculty at UMR. Adjunct faculty will teach most of the rest of the course-work, and non-regular faculty/teaching assistants will round out the course roster.

#### **4.3.3.3. Expectations for professional activities, special student contact, teaching/learning innovation.**

Faculty involved in this program will be expected to teach courses within the disciplines represented in the emphasis areas associated with the Professional Masters Degree Program. Many of the faculty will be already teaching the courses required for completion of the degree.

#### **4.3.4. Enrollment Projections: Student FTE majoring in program by the end of five years.**

Based upon a market survey conducted by UMR's department of engineering management, it is estimated that there will be approximately 30 FTE students in the Professional Science Masters Degree Program by the end of 5 years.

#### **4.3.5. Student and Program Outcomes**

##### **4.3.5.1. Number of graduates per annum at three and five years after implementation.**

It is anticipated that there will be approximately 3-5 PSM degree recipients three years after implementation of the proposed degree program, and approximately 5 PSM degree recipients per year by the end of the fifth year.

##### **4.3.5.2. Skills specific to the program.**

Students leaving the program will be able to integrate an understanding of basic science and mathematics with business expertise that would allow them to professionally serve the scientific technology markets in St. Louis, Kansas City and the rest of the state.

##### **4.3.5.3. Proportion of students who will achieve licensing, certification, or registration.**

There is currently no licensing or registration specific to the Professional Science Masters Degree, which is an emerging degree nationwide.

##### **4.3.5.4. Performance on national and/or local assessments, e.g., percent of students scoring above the 50th percentile on normed tests; percent of students achieving minimal cut-scores on criterion-referenced tests. Include expected results on assessments of general education and on exit assessments in a particular discipline as well as the name of any nationally recognized assessments used.**

Since this is an upper-level degree program with no accreditation, it is not expected that students will take further standardized tests after graduation or during the program.

##### **4.3.4.5. Placement rates in related fields, in other fields, unemployed.**

We expect that a large part of the target population served by this degree will consist of science professionals already in the market place, who are interested in obtaining an advanced level of understanding in selected areas of science and technology, combined with business expertise

that would enhance their advancement into the management track in technology based industries. Hence, we expect a significant fraction of the degree recipients in the program to already be employed, and that in excess of 80% of the remaining students will find employment within a related technological field

**4.3.6. Program Accreditation: Institutional plans for accreditation, if applicable, including accrediting agency and timeline. If there are no plans to seek specialized accreditation, please provide reasons.**

There is currently no accrediting body for the Professional Science Masters Degree Program.

**4.3.7. Alumni and Employer Survey: Expected satisfaction rates for alumni, including timing and method of surveys.**

Alumni surveys will be conducted annually, using similar methods to those currently employed by other graduate programs within the College of Arts and Sciences. Employer surveys will also be conducted annually, using similar methods to those currently employed by other graduate programs within the College of Arts and Sciences.

## APPENDIX A: Existing UMR Faculty and Programs Supporting the PSM Degree

The Professional Science Master's degree program at UMR provides a unique opportunity to integrate the research and teaching expertise of faculty members in the Departments of Biological Sciences, Computer Science, Mathematics and Statistics, Chemistry, Physics, and Engineering Management. All of the courses that will be taught for the PSM are already being taught as part of other graduate programs on campus. Thus, the proposed PSM degree program will take advantage of existing resources and combine them in a highly technological environment to develop a world-class Professional Science Master's graduate program.

Current UMR Graduate Faculty that would teach PSM courses:

### Faculty Members to Teach PSM Courses

#### Biological Sciences

- R. Aronstam**, *Professor and Department Chair*, Ph.D., (University of Rochester) – Biochemical and pharmacological characterization of neurotransmitter receptors; synaptic transduction mechanisms; role of G proteins in synaptic signaling.
- R. Brown**, *Professor*, Ph.D., (Colorado State University) – Biomaterials for bone repair, bioactive glass coatings, porous bioactive glass scaffolds, bioabsorbable composites.
- C. N. Chen**, *Assistant Professor*, Ph.D., (National Taiwan University and Washington University in St. Louis) – Plant hormones ABA; discovery and enhancement of industrial enzymes.
- R. Frank**, *Associate Professor*, Ph.D., (Ohio State University) – Identification of gene families using computer algorithms; evolution and expression; gene structure and expression.
- Y. Huang**, *Assistant Professor*, Ph.D., (University of Wisconsin-Madison) – Environmental toxicology; phytoestrogens; biochemical and physiological pathways of endocrine disruptors.
- P. Lutz**, *Professor*, Ph.D., (Duke University) – Immunology; immune system function in children with exposure to lead.
- A. Maglia**, *Assistant Professor*, Ph.D., (University of Kansas) – Evolution of amphibians and reptiles: phylogenetic relationships and anatomical diversity.
- M. Mormile**, *Associate Professor*, Ph.D., (University of Oklahoma) – Anaerobic microorganisms; biodegradation of organic chemicals; extremophiles in saline environments.
- D. Niyogi**, *Assistant Professor*, Ph.D., (University of Colorado) – Effects of humans on stream ecosystems; biodiversity in ecosystem processes; nutrient uptake in streams.
- T. Numbere**, *Lecturer*, Ph.D., (Kansas State University) – Growth regulation of crops, extraction, separation, isolation, role of organosulfur compounds.
- K. Shannon**, *Assistant Professor*, Ph.D., (Harvard Medical School) – Temporal and spatial control of cell division and cytokinesis.
- D. Westenberg**, *Associate Professor*, Ph.D., (University of California, Los Angeles) – Cell-cell interactions; nitrogen fixation; bacterial gene expression.

## **Business Administration**

**Caroline M. Fisher**, *Professor and Chair*, Ph.D., (Bowling Green State University) – Customer Focus, Satisfaction, and Loyalty

**Eric W. Anderson**, *Business Development Specialist*, Center for Entrepreneurship & Outreach J.D., MBA (University of Missouri Columbia) – Entrepreneurship, Economic Development, Public Policy, Accounting

**Stephanie Fitch**, *Instructor and Advisor*, Business Administration M.S., (University of Texas – Austin)

**Lance Gentry**, *Assistant Professor*, Ph.D., (Michigan State University) – New Product Development and Forecasting

**Morris Kalliny**, *Assistant Professor*, Ph.D., (The University of Texas-Pan American) – The Impact of culture on consumer behavior, International Marketing Strategy and International Advertising

**Bih-Ru Lea**, *Assistant Professor*, Ph.D., (Clemson University) – Management Accounting Information Systems, Enterprise Resource Planning, Supply Chain Management, Business Simulation, and Manufacturing Performance

**John Parfet**, *Technology Business Development Director*, Center for Entrepreneurship & Outreach – Business development, commercialization, entrepreneurship, management, capitalization, product development

**Raymond M. Kluczny**, *Professor Emeritus*, Ph.D., (Arizona State University) – Decision Support Systems, Enterprise Wide Systems

## **Chemistry**

**F. Blum**, *Curators' Professor*, Ph.D., (University of Minnesota) – Physical chemistry; polymers; colloids; NMR; nano-materials.

**C. Chusuei**, *Assistant Professor*, Ph.D., (George Mason University) – Analytical/physical chemistry; surface science; chemical analysis at the solid-aqueous solution interface.

**H. Collier**, *Professor and Vice Provost for Graduate and Undergraduate Studies*, Ph.D., (Mississippi State University) – Inorganic, organo-metallic, polymer chemistry, and coating science.

**N. Ercal**, *Professor*, M.D., (Istanbul Medical Faculty), Ph.D., (Hacettepe University) – Analytical biochemistry; metal toxicity; free radicals in biological systems.

**S. Kapila**, *Missouri Soybean Merchandising Council Endowed Professor*, Ph.D., (Dalhousie University) – Environmental chemistry; mass spectrometry.

**N. Leventis**, *Associate Professor*, Ph.D., (Michigan State University) – Physical, analytical and organic electrochemistry; sol-gel materials; polymer cross-linked aerogels; nanotechnology.

**G. Long**, *Professor*, Ph.D., (Syracuse University) – Inorganic and solid state chemistry and Mössbauer spectroscopy.

**Y. Ma**, *Professor*, Ph.D., (Iowa State University) – Bio-analysis and bio-separations, including proteins, peptides, amino acids, small molecules, cancer markers and other biological compounds.

**P. Nam**, *Assistant Professor*, Ph.D., (University of Missouri-Columbia) – Analytical chemistry; environmental chemistry.

**V. Reddy**, *Assistant Professor*, Ph.D., (Case Western Reserve University) – Organic and physical organic chemistry; carbocation reaction mechanisms.



- T. Schuman**, *Associate Professor*, Ph.D., (University of Alabama in Huntsville) – Interfacial spectroscopy and chemistry; coatings; adhesion; corrosion protection; adsorption phenomena; organic polymer syntheses; industrial agricultural applications and research.
- E. Sinn**, *Professor*, Ph.D., (University of New South Wales) – Inorganic chemistry; biomolecules; drug design; anti-tumor compounds; crystallography.
- C. Sotiriou-Leventis**, Ph.D., (Michigan State University), *Professor* – Organic materials, physical organic and bioorganic chemistry.
- P. Stavropoulos**, *Associate Professor*, Ph.D., (Imperial College of Science and Technology, London) – Inorganic chemistry; inorganic catalysis; bioinorganic chemistry; organometallics.
- J. Switzer**, *The Donald L. Castleman/FCR Endowed Professor of Discovery in Chemistry*, Ph.D., (Wayne State University) – Inorganic materials chemistry; electrochemistry; nanoscale materials.
- T. Tokuhiro**, *Adjunct Professor*, Ph.D., (Tokyo Institute of Technology) – NMR; science and engineering application of polymer gels; NMR relaxation phenomena; molecular dynamics; characterization of bio-tissues by NMR imaging method.
- M. Van De Mark**, *Associate Professor*, Ph.D., (Texas A&M University) – Polymers; organic chemistry; electrochemistry; coatings; corrosion.
- P. Whitefield**, *Professor and Department Chair*, Ph.D., (University of London – Queen Mary College) – Physical and analytical chemistry; chemical and physical characterization of aerosols.
- J. Winiarz**, *Assistant Professor*, Ph.D., (State University of New York at Buffalo) – Polymeric photonic materials and devices with emphasis on photorefractive composites.
- K. Woelk**, *Associate Professor*, Ph.D., (University of Bonn, Germany) – In situ NMR spectroscopy and imaging; homogeneous catalysis; supercritical fluids; soft-matter materials science.

### Computer Science

- M. Cheng**, *Assistant Professor*, Ph.D., (University of Minnesota) – Computer networks; wireless networking and mobile computing; combinatorial optimization with focus on network applications.
- F. Ercal**, *Professor and Department Chair*, Ph.D., (Ohio State University) – Bioinformatics; parallel and distributed processing; computer vision.
- J. Leopold**, *Assistant Professor*, Ph.D., (University of Kansas) – Bioinformatics; databases; scientific visualization.
- X. Liu**, *Associate Professor*, Ph.D., (Texas A&M) – Software engineering; software requirements analysis; software testing.
- S. Madria**, *Assistant Professor*, Ph.D., (Indian Institute of Technology, Delhi, India) – Databases; web data management; mobile security; web mining; mobile computing.
- B. McMillin**, *Professor*, Ph.D., (Michigan State University) – Distributed/parallel computing; fault tolerance; formal methods in software engineering.
- C. Sabharwal**, *Professor*, Ph.D., (University of Illinois Urbana-Champaign) – Graphics; image databases; computer vision; scientific visualization.
- D. Tauritz**, *Assistant Professor*, Ph.D., (Leiden University, The Netherlands) – Evolutionary algorithms; natural computation; artificial intelligence; computer security.

**M. Thakur**, *Assistant Professor*, Ph.D., (University of Rochester) – Complexity theory; network and graph algorithms; theory of simulation and modeling; quantum computation.

**R. Wilkerson**, *Professor*, Ph.D., (Southern Illinois University) – Intelligent systems; automata theory.

**F. Xia**, *Associate Professor*, Ph.D., (Université Pierre et Marie CURIE (Paris VI), Institut Blaise PASCAL, Paris) – Software engineering; computer vision/pattern recognition.

**W. Yu**, *Assistant Professor*, Ph.D., (University of Louisville) – Demand forecasting in supply chain management; data mining/text mining; software agents; business process reengineering; knowledge management; business intelligence.

**Y. Zhao**, *Assistant Professor*, Ph.D., (University of Minnesota) – Data mining; bioinformatics; machine learning; information retrieval.

### **Economics & Finance**

**Gregory M. Gelles**, *Professor and Chair*, Ph.D., (West Virginia University) – Mathematical Economics, Decision-Making under Risk

**Richard Bryant**, *Associate Professor*, Ph.D, (University of California-Davis) – Labor Economics, Applied Microeconomics

**Eun Soo Park**, *Associate Professor*, Ph.D, (Northwestern University) – Applied Game Theory, international Trade, Industrial Organization

**Michael Davis**, *Assistant Professor*, Ph.D., (University of California, San Diego) – Macroeconomics, Applied Econometrics, Sports Economics, Economics of R&D

**Julie Gallaway**, *Assistant Professor*, Ph.D., (Colorado State University) – Economic Development, Time Allocation, Gender & Labor Markets

**Xuejing Xing**, *Assistant Professor*, Ph.D., (University of Missouri-Columbia) – Corporate Finance, Investments, and Capital Markets

**Zhang, Duo**, *Assistant Professor*, Ph.D., (West Virginia University) – Investments international financial markets

### **Information Science & Technology**

**Barry Flachsbarth**, *Professor and Chair*, Ph.D., (Stanford University) – Artificial Intelligence, Large Engineering Databases

**Richard Hall**, *Associate Professor*, Ph.D., Texas Christian University – Human Computer Interaction, Web and New Media Design, Web Based Learning Technologies

**Michael Hilgers**, *Associate Professor, Associate Chair, and Director of the Center for Technology-Enhanced Learning*, Ph.D., (Brown University) – Learning Technologies, Participatory Simulations, Interactive Media, Virtual Reality, Software Architecture

**Hong Sheng**, *Assistant Professor*, Ph.D., (University of Nebraska-Lincoln) – Human-Computer Interaction

**Williamkehr**, *Instructor and Advisor*, Ph.D., (University of Missouri – Rolla) – Telecommunications and Data Networks, E-Commerce, Marketing, Innovation Diffusion

**Sundar Srinivasan**, *Post Doctoral Fellow*, Ph.D., (University of Missouri-Rolla) – Product Cannibalization, Forecasting, Enterprise Resource Planning

**Vincent Yu**, *Assistant Professor*, Ph.D., (University of Louisville) – Intelligent Agents, Demand Forecasting, Business Process Reengineering, Data Mining, and Knowledge Management

## Mathematics and Statistics

- E. Akin–Bohner**, *Assistant Professor*, Ph.D. (University of Nebraska–Lincoln) – Dynamic equations on time scales; differential equations; difference equations; oscillation; boundary value problems.
- M. Bekker**, *Assistant Professor*, Ph.D., (Institute of Mathematics, National Academy of Sciences, Kiev, Ukraine) – Operator theory and applications.
- M. J. Bohner**, *Associate Professor*, Ph.D. (University of Ulm, Germany) – Ordinary differential equations; dynamic equations on time scales; difference equations; Hamiltonian systems; variational analysis; boundary value problems; control theory; oscillation.
- W. J. Charatonik**, *Professor*, Ph.D. (Warsaw University) – Topology; continuum theory; hyperspaces and inverse limits.
- S. L. Clark**, *Professor*, Ph.D. (University of Tennessee) – Differential and difference equations; operator theory; direct and inverse spectral theory; inequalities.
- R. J. Dzwilewicz**, *Professor*, Ph.D. – Geometric analysis; algebraic geometry; analytic number theory; partial differential equations; differential geometry.
- D. Drain**, *Assistant Professor*, Ph.D. (Arizona State University) – Experiment design; response surface methods; spatial statistics; nonparametric smoothing; hybrid heuristic optimization involving genetic algorithms; data mining.
- G. Gadbury**, *Associate Professor*, Ph.D. (Colorado State University) – Causality; foundations of inference; mathematical statistics; nonparametric methods; analysis of high dimensional data.
- G. Gan**, *Associate Professor*, Ph.D. (Kansas State University) – Mathematical statistics; probability theory; extreme value theory; stochastic processes.
- D. E. Grow**, *Associate Professor*, Ph.D. (University of Nebraska–Lincoln) – Fourier analysis; mathematical physics; functional analysis.
- L. M. Hall**, *Professor and Department Chair*, Ph.D. (University of Missouri–Rolla) – Ordinary differential equations; mathematical analysis; geometry.
- R. H. Hering**, *Associate Professor*, Ph.D. (Southern Illinois University) – Ordinary and functional differential equations; stability theory; oscillation theory.
- E. M. Insall**, *Associate Professor*, Ph.D. (University of Houston) – Logic; nonstandard methods; algebra.
- V. K. Le**, *Professor*, Ph.D. (University of Utah) – Nonlinear differential equations; bifurcation; calculus of variations.
- I. H. Morgan**, *Associate Professor*, Ph.D. (Pennsylvania State University) – Discrete mathematics and combinatorics; finite fields and their applications.
- R. P. Roe**, *Associate Professor*, Ph.D. (University of Wyoming) – Chaotic dynamical systems; topological dynamics; geometric topology; geometric analysis.
- V. A. Samaranayake**, *Professor*, Ph.D. (Kansas State University) – Mathematical statistics; time series analysis; statistical applications in biology and economics.
- X. Wen**, *Assistant Professor*, Ph.D. (University of Minnesota) – Dimension reductions; nonparametric regression; statistical genetics; biostatistics.

## Physics

- R.. Alexander, Jr., Professor, Ph.D.** (Cornell University) – Optical properties of materials from microwave to ultraviolet wavelengths; optical properties of graphite and other graphitic materials.
- M. Bertino, Assistant Professor, Ph.D.** (University of Göttingen) – Surface nanostructures; collisions between large van der Waals clusters and surfaces.
- R. Bieniek, Associate Professor, Ph.D.** (Harvard University) – Quantum mechanical and semiclassical methods of investigating atomic and molecular collisions; methodologies and organizational processes that promote educational innovation.
- R.. DuBois, Professor, Ph.D.** (University of Nebraska–Lincoln) – Ionizing interactions between charged particles and atoms or molecules; investigation of multi-parameter coincidence techniques, ultra-high vacuum conditions, and unique spectrometers capable of extracting differential information for small signal rates.
- D. Hagen, Professor, Ph.D.** (Purdue University) – Experimental and theoretical research in water microphysics, nucleation, cluster modeling, and aerosol science; environmental effects of advanced commercial aircraft engines; laboratory cloud chambers to simulate various cloud and ice nucleation processes
- B. Hale, Professor, Ph.D.** (Purdue University) – Atmospheric microphysics through molecular modeling; statistical mechanical studies of water and ice nucleation; Monte Carlo computer simulations of water/ice systems and scaled models for nucleation.
- D. Madison, Curators' Professor, Ph.D.** (Florida State University) – Quantum mechanical treatment of collisions between simple charged particles and atoms.
- J. Medvedeva, Assistant Professor, Ph.D.** (Institute of Metal Physics, Russian Academy of Science) – Condensed matter theory; first-principles computational methods based on density-functional theory to study structural, electronic, magnetic and optical properties of solids; novel multifunctional materials for advanced technologies including photovoltaic, spintronic, thermoelectric, and alternative energy applications.
- R. Olson, Curators' Professor, Ph.D.** (Purdue University) – Quantum mechanical and semiclassical theories to determine cross sections in heavy particle collisions; weakly-bound Rydberg atoms and anti-matter and multiply-charged ions colliding with many-electron atoms.
- P. Parris, Professor and Department Chair, Ph.D.** (University of Rochester) – Dynamical processes in condensed matter; exciton transport in molecular crystals; small polaron conduction in polymers and ceramics; disorder-induced localization of classical and quantum waves; nonequilibrium transport, trapping and relaxation of quasi-particles in low temperature solids; hopping conduction in disordered materials.
- J. Peacher, Professor, Ph.D.** (Indiana University) – Perturbative methods to describe elastic, excitation, and charge-transfer processes in ion-atom collisions.
- O. Pringle, Curators' Teaching Professor, Ph.D.** (University of Missouri–Columbia) – Neutron diffraction experiments and Mössbauer effect studies of technologically important new materials, including rare earth-iron-boron and rare earth-iron-nitrogen supermagnets.
- J. Schmitt, Associate Professor, Ph.D.** (University of Michigan) – Investigation of how a pure vapor or mixture of vapors condenses into liquid droplets; cloud simulation chambers and their optical diagnostic equipment; use of precision expansion cloud chamber to measure the nucleation of water and hydrocarbons.
- M. Schulz, Curators' Professor, Ph.D.** (Universität Heidelberg) – Atomic physics, with an emphasis on ion-atom collisions; application of ion energy-loss spectroscopy, COLd Target Recoil Ion and Electron Momentum Spectroscopy (COLTRIEMS) and coincidence techniques to study ion-atom collisions.
- J. Story, Associate Professor, Ph.D.** (University of Southern California) – Interaction of ultra-short laser pulses with multi-electron atoms; temporal evolution of highly excited atomic states using pump-probe laser techniques; effects of high-intensity laser pulses on atomic systems.

- T. Vojta**, *Assistant Professor*, Ph.D. (Chemnitz University of Technology) – Quantum and classical phase transitions, critical behavior, superconductivity, and transport in disordered materials.
- G. Waddill**, *Professor*, Ph.D. (Indiana University) – Atomic scale investigations of surfaces and interfaces; x-ray photoelectron spectroscopy and photoelectron diffraction for the study of the composition and structure of surfaces, interfaces, and thin films; structure–property relationships in advanced materials.
- G. Wilemski**, *Professor*, Ph.D. (Yale University) – Statistical mechanics and thermodynamics to theoretically investigate the microphysics of aerosol particles and the kinetics of phase transitions.
- A. Yamilov**, *Research Assistant Professor*, Ph.D. (The City University of New York) – Analytical and numerical techniques to study wave propagation and localization in random and periodic media with a view toward experimental corroboration; effects of disorder in photonic crystal structures; interplay between light localization and amplification; random lasing; mesoscopic phenomena in light and acoustic wave transport.

### **Systems Engineering and Engineering Management**

- W. Daughton**, *Professor and Department Chair*, Ph.D. (University of Missouri – Columbia) – Process management; project management; strategic planning; organizational development.
- B. Dow**, *Lecturer*, Ph.D. (Purdue University) – Project management; engineering economics; finance.
- D. Enke**, *Assistant Professor*, Ph.D. (University of Missouri – Rolla) – Financial engineering; financial forecasting; risk management; investment; engineering economics; electricity markets.
- R. Luechtefeld**, *Assistant Professor*, Ph.D. (Boston College) – Action research; dialog, group and organizational learning; learning simulations; social processes.
- S. Murray**, *Associate Professor*, Ph.D. (Texas A&M University) – Industrial engineering; project management; productivity improvement; human factors; safety.
- D. Myers**, *Professor*, J.D. (St. Louis University) – Management of technology; technical entrepreneurship; technology transfer; product management.