Form NP
NEW DEGREE PROGRAM PROPOSAL

Sponsoring Campus: Missouri University of Science and Technology

College or School: n/a

Department: Psychological Science

Program Title: Industrial/Organizational Psychology

Degree: Master of Science

Option: 1) Leadership in Technical Organizations
2) Human factors
3) Psychometrics

CIP Classification: 42.2804

Implementation Date: January 2014

Expected Date of First Graduation: May 2015

AUTHORIZATION

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EXECUTIVE SUMMARY

The proposed **Industrial/Organizational Psychology Master of Science Program** emphasizes the application of psychological science to enhance the performance and well-being of people in organizations. I/O psychologists develop assessments of people for selection and placement into jobs, effective training programs, strategies for organizational development, measurement of performance, and ways to promote quality of work-life. Students will receive a core foundation in industrial / organizational psychology as well as statistics and research methods. Students will then select a thesis or non-thesis option. For the non-thesis option, students will select a specialization emphasis: human factors, leadership in technical organizations, or psychometrics.

The number of I/O master's programs grew extensively between 1983 and 1993 (15 to 55 programs) and then to 100 programs by 2003. The growth has slowed, but continues, and the interest is high. The mean number of applicants to I/O master's programs is 56 a year.[1] With three graduate certificate programs that can feed the program and the program can be offered via distance, the demand for this program is expected to be high. Further, the Bureau of Labor Statistics predicts a strong market growth for individuals with a master's in I/O. This program can benefit students with interests in HR, especially in technological companies.

A natural outgrowth of the department, this master's program could address the looming crisis in the "war for talent" (*The Economist*, October, 2006). This proposed program will develop individuals who can manage the human resources within technological environments, understand the human factors relevant to these technologies, and apply the research and scientific methods necessary to implement new technologies users will accept. This degree will provide students with an unmet and unique opportunity to attain graduate-level training in this field, helping Missouri and the nation deal with the managing talent challenge. In addition, this program is likely to attract more women as well as racially and ethnically diverse students and faculty to campus.

Between 2008 and 2018 the need for psychologists is likely to grow 12%, but the need for I/O psychologists could grow as much as 26% (*Occupational Outlook Handbook* (2010-2011) Bureau of Labor Statistics, *http://www.bls.gov/oco/ocos056.htm#outlook*). In addition, students with strong statistical and research methods skills, which our graduates will have, will be in higher demand (*Occupational Outlook Handbook*).

Students expressed a strong interest in the proposed master's program. In three surveys, 3 of 18 junior and senior psychology majors (2007) and 5 of 41 psychology majors (2010) indicated they would enroll while an additional 11 in both groups would seriously consider enrolling. At Ft. Leonard Wood, 19 of 26 students in the MANPRINT course

[1] Tett, Brown, Walser, Simonet, Davis, Tonidandel, & Hebl (2012). The 2011 SIOP I-O psychology graduate program benchmarking survey: Overview and selected norms, *The Industrial-Organizational Psychologist, 50*(2), 25-37

(2008) were interested in the program. Finally, the growth in the number of I/O master's programs indicates national interest.

The addition of one more I/O faculty member will be necessary to offer courses once a year. This faculty member will contribute predominantly to the undergraduate program (as all faculty do), minimizing the cost of this faculty member for the graduate program.

The proposed master's program is a natural fit with the premier applied science and technological focus of Missouri S&T. I/O Psychology is strongly founded in the scientific method, often advancing methodological tools or techniques, refining hiring and promotion procedures, and developing appropriate training programs. In addition, the proposed program promises to reach a market of traditional and non-traditional students not currently served by any of Missouri S&T's existing graduate degree programs. Overall, the **Industrial/Organizational Psychology Master of Science** degree program will provide graduates who can contribute directly to the economic well-being of both the state and nation by helping business, government, and other organizations to improve their identification and development of a talented work force.

1. INTRODUCTION

1.A. Summary of Academic Components and Examples of Career Paths

The main academic components of the proposed **Industrial/Organizational Psychology Master of Science Program** include 15 hours of core Industrial and Organizational (I/O) Psychology courses such as industrial psychology, organizational psychology, the psychology of leadership, group dynamics, personnel selection, and a seminar in I/O psychology that will give the students a good overview and foundation in I/O psychology. The students also will be required to complete 9 hours of methods courses, selecting courses from the Psychological Science and Mathematics and Statistics departments, 9 hours in a specialization emphasis (Human Factors (HF), Leadership in Technical Organizations, or Psychometrics), and 3 elective hours from one of the specialization emphasis areas. The HF, Leadership in Technical Organizations, and Psychometrics emphases are non-thesis programs; however, if students in the HF, Leadership in Technical Organizations, and Psychometrics emphasis areas wish to complete a thesis, this will require at least six hours of Psych 490 Research in addition to the required 36 hours specified above. There also is a thesis option available (a specialization emphasis is not required with the thesis option). Students in any emphasis area or the thesis option who wish to complete an internship will require three to six additional internship hours. Also, as most of the courses in the I/O program are currently offered on-line, the program will be offered via distance.

Students who complete this program could pursue careers as managers, human resources specialists, and assessment and research specialists in educational and business settings.

1.B. History of Program Evolution and Why Proposed Now

In its role as Missouri's premier technological research university, Missouri S&T has enhanced management-related disciplines with graduate degrees currently offered in the Departments of Business and Information Technology, and Engineering Management and Systems Engineering. Table 1 below shows the start dates of, enrollments within, and number of graduates from these programs (data from the Missouri S&T Registrar's Office, May 2011). Nevertheless, a gap still exists in Missouri S&T's academic portfolio with regard to the specific application of psychological principles to business and other organizational settings. An **Industrial/Organizational Psychology Master of Science Program** would address this deficit and provide students in Missouri and beyond with a unique opportunity to attain graduate-level training in the application of psychological principles to business, with a strong methodological and technical emphasis that fits well with Missouri S&T's focus as a technological research university.

Table 1: Management-related programs with graduate degrees

Department	Program	First offered	Total number of graduates since inception	Total Program Enrollment as of Fall 2011
Business & Information Technology	MBA	Fall 2006	38	103
Engineering Management & Systems Engineering	Ph.D. – Systems Engineering	Spring 2007	2	26
Engineering Management & Systems Engineering	MS – Systems Engineering	Fall 2000	430	641 (since 2004)
Engineering Management & Systems Engineering	Ph.D. - Engineering Management	Semester unknown, 1981	205	103 (since 2004)
Engineering Management & Systems Engineering	MS – Engineering Management	Semester unknown, 1970	3171	933 (since 2004)

The first graduate program in Industrial/Organizational Psychology (I/O) was established in 1915 at Carnegie Tech (Lowman, Kantor, & Perloff, 2007[2]), later re-named Carnegie Mellon University. I/O psychology programs were generally offered at the doctoral level until the 1950s when the first master's degrees were considered (Lowman et al., 2007). A recent review of the master's level graduate training programs in I/O psychology on the Society for Industrial/Organizational Psychology's website (http://www.siop.org/gtp/GtpLookup.asp) finds at least 13 master's programs in I/O psychology offered at technologically- and engineering-oriented universities such as Clemson University, Florida Institute of Technology, Purdue (IUPUI), University of the Philippines, and Wayne State University. A more detailed analysis of these programs is presented in the Student Demand subsection (3.A.2). There are no other technologically- or engineering-oriented universities in Missouri that offer a master's degree in industrial/organizational psychology.

The goals of I/O psychology are clearly consistent with those in a technologically-oriented environment, and the proposed **Master's degree in Industrial/Organizational Psychology** is a natural fit with the overall curriculum of Missouri S&T as a premier applied science and technological university. To begin, I/O Psychology is a science that is strongly founded in the scientific method. The discipline of I/O psychology employs a variety of sophisticated statistical procedures for refining hiring and promotion procedures and for developing appropriate training programs in organizations. These

[2] Lowman, R. L., Kantor, J., & Perloff, R. (2007). A history of I-O psychology educational programs in the United States. In L. L. Koppes (Ed.), *Historical Perspectives in Industrial and Organizational Psychology* (pp 111-137). Manwah, NJ: Lawrence Erlbaum.

methods can dramatically reduce unnecessary costs while enhancing the productivity of an organization. Finally, a wide range of technologies are employed in I/O Psychology. For example, computerized testing and selection programs are used in HR decisions, computer-mediated communication is essential for distributed teams, and statistical and psychometric computer packages are used extensively to analyze data collected in studies on how to use technology in work and educational settings more effectively. The absence of an I/O program, in fact, represents a gap in Missouri S&T's offerings, compared to other well-known engineering universities. This program will help close that gap and could set us apart from our peer institutions, as only four of the sixteen offer either the master's or Ph.D. degree in I/O psychology (see Table 2).

Table 2: Peer-Group Institutions that offer an I/O Degree

Peer-Group Institutions	I/O Master's	I/O Ph.D.
California Institute of Technology		
Massachusetts Institute of Technology		
Georgia Institute of Technology		Yes
Rensselaer Polytechnic Institute		
Colorado School of Mines		
Michigan Technological University		
New Mexico Institute of Mining & Technology		
Clarkson University		
Stevens Institute of Technology		
Illinois Institute of Technology	Yes	Yes
Worcester Polytechnic Institute		
New Jersey Institute of Technology		
Florida Institute of Technology	Yes	Yes
University of Alabama – Huntsville	Yes	
South Dakota School of Mines		

The impetus for pursuing a **Master's degree in Industrial/Organizational Psychology** stems from a need for individuals trained to meet the talent shortage. I/O Psychologists help organizations define strategies, set policies, and implement practices involving the performance and well-being of people at work. Graduates of the Missouri S&T **Industrial / Organizational Psychology Master of Science** degree program will have the skills needed to help management make effective decisions regarding talent within organizations, including the assessment of people for selection and placement into jobs; development of effective training programs; strategies for organizational development; measurement of performance; and ways to promote quality of work-life. The October 7th, 2006 issue of *The Economist* contained a series of articles related to the current talent shortage in the US and globally. Several of the points raised in this series of articles are strategically important to the proposed master's program and for the professional skills that students will acquire while in the program. Summarized, these points were as follows:

- A war for talent is coming: "The Corporate Executive Board…conducted an international poll of senior human-resources managers, [and] three-quarters

reported that 'attracting and retaining' talent was their number one priority" ("The Battle for Brainpower"[3]).

- Organizations have realized that less growth than in the past is possible from automation and re-engineering; future growth must come from better people ("The Battle for Brainpower").

- Managerial talent is in short supply: Finding talented middle and senior managers is difficult, as individuals lack the necessary skills ("The World is Our Oyster"[4]).

- "Managers not only need to deal with lots of different sorts of people, but also to manage workers in different countries and often across different functions. That means even more competition for people with up-to-date management skills" ("The Battle for Brainpower").

- The HR community has no clue regarding how to define "talent"—they just sense that they need more of it ("Everybody's Doing It,"[5] "The Battle for Brainpower").

- The spectacular failure of Long Term Capital Management (which had Nobel prize winning economists on the board) and Enron, famous for only hiring the best and the brightest, testifies to the fact that talent involves more than IQ, and that greed and mismanagement can often trump intelligence ("The Battle for Brainpower").

- The development of talent management systems is going to get big: "The Yankee Group estimates that over 2,300 companies worldwide adopted some form of talent-management technology last year and that the market for this technology will almost double by 2009" (Everybody's Doing It"). In fact, the UM System has a Director of Talent Management.

According to Sullivan (2012)[6], Hempel (2012)[7], and Aguinis, Gottfredson, & Joo (2012)[8] the need to develop talent continues and I/O psychologists can help. In another recent article, "I/O Psychology goes to Mars"[9] top I/O psychologists who study teamwork are working to help astronauts develop cohesion as well as learn ways to manage conflict, as the astronauts will be living together for a long period of time within an extremely confined space.

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[3] Wooldridge, A. (October 7, 2006). The battle for brainpower. *The Economist, 381*(8498), 3-5.
[4] The world is our oyster (October 7, 2006). *The Economist, 381*(8498), 8-9.
[5] Everybody's doing it (October 7, 2006). *The Economist, 381*(8498), 5-6.
[6] Sullivan, J. (March 19, 2012) The war for talent is returning: Don't get caught unprepared (http://www.ere.net/2012/03/19/the-war-for-talent-is-returning-dont-get-caught-unprepared/).
[7] Hempel, J. (October 24, 2012). A CEO takes on the war for talent (http://management.fortune.cnn.com/2012/10/24/netsuite-zach-nelson/).
[8] Aguinis, H., Gottfredson, R. K., & Joo, H. (2012). Using performance management to win the talent war, *Business Horizons, 55*(6), 609-616.
[9] Novotney, A. (March, 2013). I/O psychology goes to Mars, *Monitor on Psychology*, 38-44.

The proposed **Master of Science in Industrial/Organizational Psychology** could allow Missouri S&T to play a significant role in helping the state and nation deal with the looming crisis concerning the identification and development of a talented work force and in filling future jobs. Finding and developing talent will require appropriate assessment methods and I/O psychologists have advanced methods for assessing knowledge, skills, and abilities. In addition, I/O psychologists research and apply the theories and techniques that underlie leadership as well as the assessment and training of leaders.

To address the talent management need, the proposed master's program creatively builds on existing graduate certificate programs and courses already offered by the Departments of Psychological Science, Mathematics and Statistics, Engineering Management and Systems Engineering, and Business and Information Technology. In addition, the three collaborative departments that support this program do not anticipate the need for additional faculty to teach the courses for this program, and perceive this as an opportunity to continue and develop the shared graduate certificate programs and collaborative relationships among the departments (see Appendix A supporting letters).

Only two courses will need to be developed during the first academic year of the program, and they will be taught by existing regular faculty. Beginning in the second year of the program one additional I/O faculty member in the Department of Psychological Science will be needed to offer the requisite courses on a consistent basis. This faculty member would also contribute to the growing undergraduate program. Further, as most of the courses in the I/O master's proposal are taught as distance courses, this program will be offered via distance.

1.C. Preliminary Steps (e.g., minors, certificates, emphasis areas)

The Department of Psychological Science is well positioned to offer this **Master of Science in Industrial/Organizational Psychology.** All of the courses in the graduate certificate programs offered by the Departments of Psychological Science, Mathematics and Statistics, Business and Information Technology, and Engineering Management and Systems Engineering are currently taught on a regular basis. These departments have the qualified faculty and staff to successfully offer this program. The courses required for each Graduate Certificate program are listed in Table 3.

Table 3: Courses offered in the Graduate Certificate Programs

Current Graduate Certificate Programs		
Psychology of Leadership	**Leadership in Engineering Organizations**	**Psychometrics**
Three courses from: Psych 308 *Social Psychology* Psych 316 *Psychology of Leadership* Psych 374 *Organizational Psychology* ERP 348 *Strategic Enterprise Management Systems* IST 351 *Leadership in Technology-*	EMgt/Psych 418 *Leadership for Engineers* EMgt 313 *Managerial Decision Making* Psych 316 *Psychology of Leadership* Psych 374 *Organizational Psychology*	Choose two courses from: Psych 307 *Industrial Psychology* Psych 364 *Tests & Measurements* Psychology 403 *Psychometrics* Choose two courses from: Stat 346 *Regression Analysis* Stat 353 *Statistical Data Analysis*

Based Organizations Fourth course from: Psych 350 *Psychology of Women* Psych 372 *Group Dynamics* Psych 378 *Social Influence* IST 480 *Web and New Media Studies* IST 487 *Research Methods in Human-Computer Interaction*		Stat 444 *Research Design*

In addition, nearly all courses in the Graduate Certificate programs are part of the proposed master's program (see Table 4). All but two psychology courses in the proposed program are currently taught.

Table 4: Courses offered in Graduate Certificate Programs also in Master's Proposal

	Courses Offered in MS Proposal	**Courses in Graduate Certificate Programs**		
Courses		**Psychology of Leadership**	**Psychometrics**	**Leadership in Engineering Organizations**
EMgt 313 *Managerial Decision Making*	X			X
EMgt 327 *Legal Environment*	X			
EMgt 380 *Work Design*	X			
EMgt 386 *Safety Engineering*	X			
EMgt 411 *Human Sysems Integration*	X			
EMgt 418 *Leadership for Engineers*	X			X
EMgt 420 *Technological Innovation Management*	X			
EMgt 456 *Advanced Personnel Management*	X			
ERP 346 *Enterprise Resource Planning Systems*	X			
ERP 347 *Supply Chain Management Systems*	X			
ERP 348 *Strategic Enterprise Management Systems*	X			
ERP 348 *Strategic Enterprise Management Systems*	X	X		
IST 351 *Leadership in Technology Based Organizations*	X			
IST 351 *Leadership in Technology-Based Organizations*	X	X		
IST 368 *Law & Ethics in E-Commerce*	X			
IST 385 *Human-Computer Interaction*	X			
IST 386 *Human-Computer Interactions Prototyping*	X			
IST 387 *Human-Computer Interaction Evaluation*	X			
IST 480 *Web and New Media Studies*	X			
IST 480 *Advanced Web and New Media Studies*	X	X		
IST 487 *Research Methods in Human Computer Interaction*	X			
IST 487 *Research Methods in Human-Computer Interaction*	X	X		

Psych 307 *Industrial Psychology*	X		X	
Psych 308 *Social Psychology*	X	X		
Psych 311 *Human Factors*	X			
Psych 315 *Environmental Psychology*	X			
Psych 316 *Psychology of Leadership*	X	X		X
Psych 350 *Psychology of Women*		X		
Psych 364 *Tests and Measurements*	X		X	
Psych 370 *Advanced Social Psychology*	X			
Psych 372 *Group Dynamics*	X	X		
Psych 374 *Organizational Psychology*	X	X		X
Psych 378 *Social Influence*		X		
Psych 380 *Cross Cultural Psychology*	X			
Psych 403 *Psychometrics*	X		X	
Psych 407 *Personnel Selection* (new course scheduled for spring 2014)	X			
Psych 410 *Seminar in Industrial/Organizational Psychology* (first offering as Psych 401 in fall 2009)	X			
Psych 418 *Leadership for Engineers*	X			
Psych 440 *Advanced Research Methods* (course to be developed)	X			
Psych 490 *Research* (course to be developed)	X			
Stat 343 *Probability and Statistics*	X			
Stat 344 *Mathematical Statistics*	X			
Stat 346 *Regression Analysis*	X		X	
Stat 353 *Statistical Data Analysis*	X		X	
Stat 444 *Research Design*	X		X	
Stat 445 *Multivariate Statistics*	X			
Stat 453 *Linear Statistical Models I*	X			
Stat 454 *Linear Statistical Models II*	X			

There is no intention of disbanding the graduate certificate programs after implementing the Industrial/Organizational Psychology Master of Science Program. These graduate certificate programs serve a unique population of individuals who seek to advance their education. Some of these students do not wish to pursue a graduate degree, but for other students, the certificate program is a step toward the master's degree, as the students could transfer their graduate certificate courses into the master's program.

As noted in Table 5, of the certificates offered by the Department of Psychological Science in collaboration with other departments, the Leadership in Engineering Organizations graduate certificate (also awarded through the Department of Engineering Management and Systems Engineering) has the highest enrollment numbers. Given the interest in the study of leadership, one of the likely reasons for the higher number of students pursuing the certificate through the Engineering Management and Systems Engineering Department is because students can enter graduate programs in the department after completing the certificate. The Psychology of Leadership graduate certificate has lower enrollments, but some prospective applicants who have expressed interest in studying leadership from the psychological perspective have indicated that

they would be more likely to apply for the Psychology of Leadership certificate if the master's degree in I/O psychology were available.

The Psychometrics Certificate started one year after the Psychology of Leadership graduate certificate and has attracted modest enrollments. While the certificate has not yet been awarded, we continue to receive inquiries about this program from national and international prospective students. With a master's program and active marketing plan, the psychometrics graduate certificate and emphasis within the proposed master's program are expected to grow and possibly become our distinguishing characteristic.

Given that only one additional faculty member is needed within the Department of Psychological Science, the majority of faculty resources are met. In addition, the Distance Education facilities are an extant resource for offering the graduate certificate programs as distance programs. Therefore, the majority of resources necessary to initiate this program are currently in place.

Table 5: Enrollments of Graduate Certificate Programs offered by Department of Psychological Science in collaboration with other departments.

Certificate	**Sponsoring Department**	**Effective Date**	**Enrollment**	**Enrollment Terms***	**Certificates Awarded**
Psychology of Leadership	Psychological Science	1/1/06	1	2006-2007	0
			1	2007-2008	0
			1	2008-2009	2
			1	2009-2010	0
			1	2010-2011	2
Psychology of Leadership	Business and Information Technology	1/1/06	2	2006-2007	2
			0	2007-2008	0
			0	2008-2009	0
			1	2009-2010	1
			1	2010-2011	0
Leadership in Engineering Organizations	Psychological Science	8/1/06	0	2006-2007	0
			1	2007-2008	0
			0	2008-2009	0
			0	2009-2010	0
			0	2010-2011	0
Leadership in Engineering Organizations	Engineering Management and Systems Engineering	8/1/06	8	2006-2007	0
			8	2007-2008	0
			9	2008-2009	1
			8	2009-2010	3
			9	2010-2011	2
Psychometrics	Psychological Science	1/1/07	1	2006-2007	0
			1	2007-2008	0
			2	2008-2009	0
			2	2009-2010	0
			2	2010-2011	0
Psychometrics	Mathematics and Statistics	1/1/07	0	2006-2007	0
			0	2007-2008	0
			0	2008-2009	0
			0	2009-2010	0

			0	2010-2011	0

*An academic year is Fall, Spring, Summer

1.D. Name of Person and Department Responsible for Program Success.

Nancy J. Stone, Ph.D. would serve as initial director of the program, pending approval of the program by the UM Board of Curators and the Coordinating Board of Higher Education. Dr. Stone is Professor and Chair in the Department of Psychological Science. Dr. Stone will be responsible for coordinating the personnel and resources to successfully implement the program when it is given final approval. Overview of this master's program will eventually become the departmental service responsibility of one of the I/O psychology faculty.

2. FIT WITH UNIVERSITY MISSION AND OTHER ACADEMIC PROGRAMS

2.A. Alignment with Mission Statement and Goals

Mission Statement

> "Missouri University of Science and Technology integrates education and research to create and convey knowledge to solve problems for our State and the technological world."

Alignment with Mission Statement

The **Industrial/ Organizational Psychology Master of Science** program clearly aligns with Missouri S&T's mission statement in that can help develop new methods for talent management, help create individuals who can identify and develop human talent, can develop leaders (especially engineering and technologically-focused leaders) who can help solve the complex, technological, and constantly changing problems of the future.

Alignment with Goals

Missouri S&T's **Strategic Plan (2011-2014)**, consisting of five Strategic Objectives, captures well its mission and the steps needed to implement and complete this mission. These strategic objectives are to (1) enrich the student experience; (2) manage enrollment and the academic portfolio; (3) expand and elevate research performance and reputation; (4) develop external resources and partnerships, and (5) develop and retain human capital, physical facilities, and cyber-infrastructure. Below is a brief summary of how this proposed master's program addresses the first two objectives. Information about how the program addresses the other objectives is available, if desired.

We can enrich the student experience by exposing our students to outstanding teachers in the department. Some of our faculty received the CET Outstanding Teaching Award on several occasions. In addition, one of our new faculty members just learned that she will be awarded the Minor Alumni Association Class of '42 Outstanding Teacher Award, an award that recognizes the top teacher among all new faculty. Therefore, the students will be able to learn from outstanding teachers. The exceptional faculty will afford the master's students opportunities for high, quality interactions with faculty and hands-on experiences through research, projects, and an optional internship (see Dr. Ford's letter in Appendix B). In addition, the psychology of leadership course and the Leadership in Technological Organizations emphasis will give students the opportunity to learn about and develop their leadership skills.

Students in this master's program also will help us manage our enrollment and academic portfolio. In particular, there is a good opportunity to increase graduate student enrollment within the proposed degree program. As indicated in Table 7, psychology, compared to engineering, not only graduates 33% more students at the bachelor's level who would be eligible for obtaining a master's degree, but there are also 95% more

students acquiring master's degrees in psychology. Also, this growth in graduate students would occur outside of the engineering programs, increasing program diversity. A review (June 6, 2011) of the graduate programs listed on the Society for Industrial/Organizational Psychology (SIOP) website (http://www.siop.org/GTP/) found 100 master's degree programs in the United States (an increase of 7 from July 10, 2010), plus eight distance programs, and an additional 15 international programs (two of which are distance programs). Historically, extensive growth occurred from 1983 (fewer than 15 programs; Shoenfelt, 2003[10]) to 1993 (about 55 programs; Lowe, 1993[11]), but from 1993 to 2003 (over 100 programs) the number nearly doubled. Although the growth has slowed, there is continued growth of master's I/O programs, suggesting a strong interest in this field.

Additionally, a master's degree program is likely to help increase the total female enrollment (see Table 7). Although 23% of the students acquiring a master's degree in engineering were women, 79% of the graduates with master's in psychology were women. Currently, 73% of our undergraduate majors in the Department of Psychological Science are female (not including our Sri Lankan program). In a review (June 2011) of the SIOP's listing of graduate programs (http://www.siop.org/gtp/GtpLookup.asp) offering terminal master's degrees at schools with strong engineering programs or programs that offer the master's degree online, 69.5% of the full-time students were female. When considering only programs offered in psychology departments, the percent of female students was 72.2%. The percent increases for part-time students (74.2% in engineering schools and distance programs, and 80.1% in psychology departments).

Table 7: Total number of degrees conferred for psychology and engineering students and the percent of women receiving those degrees.[1]

Women	**Bachelor's**		**Master's**		**Ph.D.**	
	Psych	Eng	Psych	Eng	Psych	Eng
Graduates	92,966	69,895	14,914	7,637	3,310	1,748
% Women	77.1	18.5	79.2	23.0	72.0	21.6

1. Last updated February 2011 (2008 data), National Science Foundation Division of Science Resources Statistics (http://www.nsf.gov/statistics/wmpd/degrees.cfm#master).

Similarly, this program is likely to attract a racially and ethnically diverse student population. Except for students classified as Asian/Pacific Islander, more individuals from racial and ethnic groups graduate from psychology programs than engineering programs (Table 8). Further, SIOP makes a concerted effort to recruit and retain diverse people. Therefore, as interest in I/O Psychology continues to grow, it should allow us to increase our female student enrollment as well as our enrollment of a diverse student population.

[10] Shoenfelt, E. L. (2003). Utilizing applied projects in industrial/organizational psychology graduate training: A checklist to help ensure successful experiences. *The Industrial/Organizational Psychologist, 41 (2),* 109-115.

[11] Lowe, R. H. (1993). Master's programs in industrial-organizational psychology: *Current status and a call for action. Professional Psychology: Research and Practice*, 24, 27-34.

Table 8: Number (and percent) of degrees conferred for psychology and engineering majors across racial/ethnic groups for US citizens/permanent residents.[1]

Racial/ethnic	**Bachelor's[1]**		**Master's[1]**		**Ph.D. [2] (2007)**	
Group	Psych	Eng	Psych	Eng	Psych	Eng
White	60,763 (66.4%)	45,383 (69.1%)	11,561 (63.6%)	12,077 (61.2%)	3,036 (69.7%)	2,112 (66.4%)
Asian/Pacific Islander	5,931 (6.5%)	8,343 (12.7%)	724 (4.0%)	3,494 (17.7%)	252 (5.8%)	501 (15.8%)
Black	10,271 (11.2%)	3,101 (4.7%)	2,411 (13.3%)	977 (4.9%)	271 (6.2%)	128 (4.0%)
Hispanic	8,885 (9.7%)	5,234 (8.0%)	1,543 (8.5%)	1,243 (6.3%)	420 (9.6%)	130 (4.1%)
American Indian/Alaska Native	637 (0.7%)	344 (0.5%)	104 (0.6%)	86 (0.4%)	31 (0.7%)	15 (0.5%)
Other/Unknown	5,005 (5.5%)	3,310 (5.0%)	1,837 (10.1%)	1,870 (9.5%)	347 (8.0%)	294 (9.2%)

1. Last updated February 2011 (2008 data), National Science Foundation Division of Science Resources Statistics (http://www.nsf.gov/statistics/wmpd/degrees.cfm#master).

College or Departmental Priority

- The Provost continues to support the development of this program.
- The department considers this an important and natural development for our department.

2.B. DUPLICATION AND COLLABORATION WITHIN CAMPUS AND ACROSS SYSTEMS

A terminal master's degree indicates an individual has received the proper training for employment at the master's level, and MS I/O Psychology graduates would be qualified for a variety of positions including human resources or management. Non-terminal master's degrees may be earned in route to earning the Ph.D.

Within the UM System, only UMSL has a terminal master's degree in General Psychology in which a student may emphasize industrial/organizational psychology. However, UMSL only accepts one or two terminal master's students annually as the focus at UMSL is on the Ph.D. in industrial/organizational psychology. Therefore, there would be minimal duplication between the UMSL degree and this proposed degree. Further, there should be minimal competition between the graduates at UMSL and S&T, as UMSL students generally graduate at the doctoral level and the S&T students would graduate at the master's level. UMSL and S&T have discussed sharing courses and developing a common colloquium series, and are considering the possibility of UMSL's PhD students teaching courses at S&T.

MU offers a Ph.D. in Organizational Behavior/Human Resources, but it is offered through the Department of Management so it is highly unlikely that we would be competing for the same students. In addition, the S&T graduates would likely not be competing with the MU graduates for jobs. In fact, 100% of MU's recent graduates went into teaching in a business school (as reported on the SIOP website for graduate programs, http://www.siop.org/gtp/gtpDisplay.asp?program=44).

The only institution in Missouri that offers a terminal master's degree in industrial/organizational psychology is Missouri State University (MSU). Collaborating with UMSL and MSU is extremely feasible, but this option has not yet been explored in detail.

Finally, neither the UMSL program nor the terminal master's program in industrial/organizational psychology at MSU has the technological focus that the Missouri S&T degree has.

3. BUSINESS-RELATED CRITERIA AND JUSTIFICATION

3.A. Market Analysis

3.A.1. Need for Program

Market Demand Supporting Data

The market demand is strong. According to the 2007 American Psychological Association *Guide to Graduate Programs*, there were 61 Psychology programs in the entire United States that offered a terminal master's degree in Industrial/Organizational with 15 of them located in the Midwest region (i.e., Arkansas, Illinois, Indiana, Iowa, Kansas, Michigan, Missouri, Nebraska, Ohio, Minnesota, and Wisconsin). The number of programs continues to grow, as a more recent (June 2011) review of the graduate programs listed on the Society for Industrial/Organizational Psychology website (http://www.siop.org/GTP/) identified 123 master's degree programs, 11 of which were distance programs. Most of these programs were in the United States (n=108), including eight distance programs. The only identified I/O master's program in the state of Missouri is at Missouri State University in Springfield (As mentioned above, UMSL's program is a master's in general psychology, with a possible emphasis in I/O, and is not listed). In contrast to the proposed program, the program at Missouri State University does not include areas of specialization in human factors or leadership in technological organizations, and is not offered via distance education.

The increase in the number of these graduate programs is not surprising given the growth outlook for psychology and industrial/organizational psychology, in particular. According to the *Occupational Outlook Handbook* (2010-2011) from the Bureau of Labor Statistics (June 9, 2011; *http://www.bls.gov/oco/ocos056.htm#outlook)*, "employment of psychologists is expected to grow 12% from 2008 to 2018." The outlook is even brighter for industrial/organizational psychologists. "Industrial-

organizational psychologists also will be in demand to help to boost worker productivity and retention rates in a wide range of businesses. Industrial-organizational psychologists will help companies deal with issues such as workplace diversity and antidiscrimination policies. Companies also will use psychologists' expertise in survey design, analysis, and research to develop tools for marketing evaluation and statistical analysis" (June 9, 2011; *http://www.bls.gov/oco/ocos056.htm#outlook*). In addition, "psychologists with extensive training in quantitative research methods … may have a competitive edge over applicants without such background" (June 9, 2011; *http://www.bls.gov/oco/ocos056.htm#outlook*). Our students would have these skills.

Given the anticipated need for industrial/organizational psychologists, the job prospects are good for job candidates trained at the master's level in industrial/organizational psychology. "Master's degree holders in fields other than industrial-organizational psychology will face keen competition," but the percent of growth for industrial/organizational psychologists could be as high as 26% (June 9, 2011; *http://www.bls.gov/oco/ocos056.htm#outlook*).

In addition, ***Money Magazine*** (2006) featured the "top ten jobs" in the United States with regard to factors such as pay, flexibility, growth, and ease of entry. The fourth ranked job was "Human Resources Manager" (http://money.cnn.com/popups/2006/moneymag/bestjobs/frameset.4.exclude.html; http://money.cnn.com/magazines/moneymag/bestjobs/2006/snapshots/4.html), a likely job outcome for Missouri S&T students earning the proposed I/O master's degree. In 2011, the Missouri Economic Research and Information Center's (MERIC) occupational projections listed the job area of Employment, Recruitment, and Placement Specialists within the area of Human Resources Management/Personnel Administration as experiencing a 10.2% projected growth through 2018 with an average of 147 jobs a year (http://www.missourieconomy.org/researchandplanning/occupations/soc_profiles/cip521001.stm). This growth projection was rated as "outstanding." The growth projection for the area of Training and Development Specialists also was rated as "outstanding" and for the area of Compensation, Benefits, and Job Analysis Specialists was rated as "great." Further, MERIC lists Missouri's Hottest Jobs for 2008-2018 (http://dese.mo.gov/divcareered/documents/MCE_Missouri_Hot_Jobs_2008-2018.pdf) which includes Human Resources Managers, all other (301 jobs), Training and Development Managers (111 jobs), Training and Development Specialists (2,034 jobs), and Industrial/Organizational Psychologist (41 jobs). Students earning the proposed I/O master's degree would have the knowledge and skills to fill these positions. Similarly, according to the *Occupational Employment Statistics* (Bureau of Labor Statistics retrieved June 2011, http://www.bls.gov/oes/current/oes193032.htm#(1)), there is a projected 1420 positions for industrial/organizational psychologists nationally, and Missouri is in the list of the top five states with the highest employment projections (50). Managing talent has become more important to a wider range of companies than it used to be. One result will be that human-resources departments have become significantly more important.

The salary outlook also is positive. The *Occupational Employment Statistics* (Bureau of Labor Statistics, retrieved June 2011 http://www.bls.gov/oes/current/oes193032.htm#(9)) estimates the average national salary for I/O psychologists to be $114,040. Salaries could be higher depending on the industry in which the graduate is employed. Examples of potential industries that could hire our graduates are listed in Table 10.

Table 10: Examples of Industries that have the highest number of jobs for I/O Psychologists, the projected number of employees needed, and the estimated mean annual salary, June 2011.

Industry	Employment Numbers	Annual mean wage
Management, Scientific, and Technical Consulting Services	580	$158,610
Scientific Research and Development Services	240	$83,050
State Government (OES Designation)	170	$71,320
Colleges, Universities, and Professional Schools	130	$69,650

In Missouri, the outlook for our graduates also is good. There are no reported salary data for the position of I/O psychologists in Missouri, but the estimated mean annual salary for relevant jobs could be as high as $112,690 for Architectural and Engineering Managers (see Table 11) *(*http://www.bls.gov/oes/current/oes_MO.htm#19-0000; Bureau of Labor Statistics Occupational Employment Statistics for Missouri, retrieved June 2011*)*.

Table 11: Possible occupations available, employment numbers, and the estimated mean annual salary for our graduates in Missouri, June 2011.

Positions in Missouri	Employment Numbers	Annual mean wage
Management Occupations	108,000	$93,710
Architectural and Engineering Managers	2,530	$112,690
Computer and Information Systems Managers	4,980	$108,910
Human Resources Managers, All Other	1,330	$103,330
Compensation and Benefits Managers	400	$98,730
Managers, All Other	4,490	$89,810
Industrial Production Managers	2,480	$87,260

It is likely that many of the human resources and management jobs will be filled by master's level I/O Psychologists according to a review of the jobs posted on the SIOP's JobNet web site (http://siop.org/jobnet/front.asp) that has been reviewed over the past

four years. In August 2008, the 59 positions requesting applicants with a minimum of a master's degree in industrial/organizational psychology, 11 (18.6%) positions were identified as human resources positions and 7 (11.9%) were identified as management positions. Also, there were 13 (22%) positions identified as "consultant;" however, the majority of these positions dealt with human resources issues (e.g., selection, personnel decisions). Two other positions were identified as I/O or I/O intern. Therefore, more than half of these positions (33, 55.9%) represented human resources positions indicating a need for master's level I/O psychologists. Another large number of positions (18, 30.5%) was for researchers, another proposed dimension to our program. The remaining positions represented administrative, assessment, education, or sales positions.

Fewer jobs were posted in July 2009 and only 11 positions required the applicants to have at a minimum a master's level education. This low number could have been due to the economy as well as time of year. As JobNet is an on-line system, the postings can change daily. Three positions involved assessment, two were in the area of organizational development, and the remaining six were single positions for I/O Intern, Personnel Psychologist, Consultant, HR Manager, Academic, and Career Planning. Therefore, about six of these positions were in areas related to human resources activities (54.5%). In July 2010, there were 20 positions seeking individuals with a minimum of a master's degree (http://siop.org/JobNet/default.aspx?login=1). These positions could be classified as HR consultant (8), HR (6), HR management (1), and psychometrics or research methods (5). The employers sought job candidates who could work on talent management/human capital development, selection, leadership development, training, and education technology, and they often wanted the candidates to have strong statistical and quantitative skills. The students graduating from our proposed master's program would have these desired skills. Further, as most, if not all, of these positions requested individuals with training in I/O, it is more likely that individuals trained in I/O will have a greater chance of filling these positions than job candidates from related fields.

In April 2011, there were 36 positions seeking individuals with a minimum of a master's degree. These positions could be classified as research, statistics, or psychometrics (13); leadership development (7); talent management/planning, performance management, or coaching (8); global learning, training, or assessment (4), organizational change (1), selection (2); and diversity management (1). Again, the employers sought job candidates who could develop their human capital and who had strong research, statistical, and psychometric skills. These are skills our graduates would have.

Meeting Missouri's Academic and Economic Needs

The Blue Sky Task Force, a task force at Missouri S&T charged to envision future educational needs to inform educational program refinement and development, identified three main areas that Missouri S&T could address. They were: critical infrastructure, transportation, and mobility; energy production, storage, and utilization; and humanics. Each of these areas could benefit from the proposed master's program by developing leaders who can coordinate the activities of these diverse groups, and increase the number of qualified individuals who can contribute to the research and measurement of issues

related to the engineering projects to ensure proper implementation of the new technology for human use. For example, Guatemalan residents were reluctant to use a deep, clean water well installed by S&T geological faculty and students due to a lack of awareness about unclean water issues. A substantial increase in well water usage occurred only after a group of S&T psychology faculty and students developed a training program to educate the residents about the well. Therefore, I/O psychologists can help increase acceptance and use of new tools and devices engineers design. Finally, human factors is designing the environment and systems that human can use, which is closely related to "humanics."

Given the demand for individuals who have the knowledge and skills to help develop and manage talent and that, nationally, there are more students getting undergraduate and graduate degrees in psychology each year than in all of engineering combined (Table 7), a case can be made for a need and demand for increased I/O Psychology education in Missouri. As Missouri and the nation begin to grapple with the many challenges in terms of their "waging a war" for talent, getting the right people in the right jobs, developing training programs, improving performance in organizations, and improving the overall quality of organizational life for people, it is important to provide I/O education and services. It is anticipated that these needs will create a demand for our graduate program and graduates.

Letters of Support

Professionals support the notion that there is a demand for more I/O psychologists trained at the master's level (See Appendix B). Dr. Hogan, President of Hogan Assessment Systems, indicated "there is substantial demand for Master's level industrial psychologists in the larger economy. I know this because I hire several each year, and they are scarce." "Right now, I believe that the supply is too limited. There is a growing need for skilled people who can function in both the technical and management roles of increasing productivity" (Mr. Zimmer, HR Researcher, AT&T). "There are increasing demands for people in private and government organizations throughout the country who can function in both technical and management roles of increasing productivity and employee satisfaction, talent development and organizational development" (Dr. Ford, Sr. Staff Scientist, Human Resources Research Organization). "[W]e need highly trained staff with skills in psychological research, statistics, psychometrics, computer programming and project management. A Master's degree in I/O psychology is an excellent start" (Dr. Ford). "[P]sychologically trained managers would greatly enhance the interpersonal interactions on the job as well as improve personnel selection, job performance and satisfaction. Having sensitive colleagues and managers who are aware of psychological factors that impact them and their coworkers would only serve to improve the science, research and business that any organization is conducting," according to Dr. Ryan, a licensed psychologist.

Dr. Hogan even acknowledged the important role UMSL's program plays at the Ph.D. level, but reports a need for more master's level I/O psychologists. "The University of

Missouri in St. Louis has been an important source of PhD's for us, but we also need Master's level Industrial/Organizational Psychologists."

These professionals perceived that our proposed program could help meet this demand for more I/O psychologists trained at the master's level. "UMR is well-suited to filling this need with its established reputation in engineering and science and its expanded management and psychology offerings" (Mr. Zimmer). Further, Dr. Ford suggested that our graduates would have the opportunity to participate in her company's summer internship program. "One opportunity for Missouri S&T I/O graduate students would be to apply to our summer internship program. Internships give our staff the opportunity not only to integrate new talent into our organization it also gives students the chance to apply their skills to actual research issues in education, military and other organizational settings."

Alumni (those graduated with a psychology degree from 1969 through 2006) also expressed interest in and a need for this master's program (see Appendix C). In March and April of 2007, 75 alumni were sent an electronic survey. Of the 32 respondents (42.7% response rate), 40.6% indicated that they would enroll in the program and 34.4% indicated that they would seriously consider enrolling in the program, reflecting 75.0% of all respondents. The alumni comments also were extremely positive such as, "I am currently a faculty member at another university in Missouri; however, I routinely have students and advisees looking for programs in Industrial/Organizational Psychology and so strongly endorse your plan for UMR to have one," "I am working at UMR and have wanted to pursue a Master's degree ever since I got my B.S. several years ago but I can not leave to go to another institution," and "I think this is great. After I graduated from UMR, I had to transfer to Iowa State in order to get my MS in Industrial Relations." (Please see Appendix C for all comments.)

As presented earlier, all three collaborating departments support the proposal (see Appendix A).

3.A.2. Student Demand for Program

There is strong student interest in this program. In February 2007, a large majority (78%) of junior and senior psychology majors who completed an Internet survey (n=18) indicated they would enroll (3, 17%) or seriously consider enrolling (11, 61%) in the proposed **Master of Science in Industrial/Organizational Psychology** program (see Appendix D). Several of the students commented that they were excited about this proposed program and would like more information about it and when it would start (please see Appendix D for all comments). More recently (fall 2010), current students enrolled in a freshman course (Psych 10) and involved in the psychology groups (e.g., Psi Chi) were surveyed. Of the 41 respondents, 5 (12%) students indicated they would enroll and 11 students (27%) would seriously consider enrolling in the program (see Appendix E). When the freshmen were removed from the analysis, these percentages increased to 17% (would enroll) and 31% (seriously consider enrolling) for a total of 48%. Given that there are many different fields in psychology and many psychology majors are often

initially attracted to the clinical or counseling fields, especially freshmen who are not aware of some other fields in psychology, we considered the students who indicated they were unlikely to enroll or they definitely would not enroll and evaluated their plans for after graduation. Of these 25 students, 15 (60%) indicated they planned to attend graduate school in another psychology area and 6 (24%) planned to get a job. The remaining four students planned to attend professional school (1), were not sure of their plans (2), or marked other (1).

A few of the students from our growing Sri Lankan programs also have expressed interest in pursuing graduate studies with us, and I/O is one area of interest.

Individuals at Ft. Leonard Wood also expressed interest in this proposed master's program (see Appendix F). An October 2008 survey of 26 individuals attending a MANPRINT (the US Army's Human Systems Integration Directorate) course at Ft. Leonard Wood revealed that a majority (73%) of these individuals would be interested in this program (see Appendix F). Of those individuals at Ft. Leonard Wood who were interested in the overall program were primarily interested in the human factors emphasis (73%), and the leadership and psychometrics emphasis areas were of the next greatest interest (46%) for this group of potential students.

Student demand also is reflected in the growth of master's degree programs in I/O Psychology, as discussed earlier. Table 12 lists I/O master's programs offered via distance (the first nine) and at schools that have strong engineering programs (the remaining 14). Students are enrolling in both distance programs as well as programs at universities with strong engineering programs. Other data accessible on SIOP's website includes the number of enrolled students, the type and number of degrees awarded per year, and the number of full-time faculty working in the program.

Data in Table 12 indicates that the distance programs (excluding Saybrook[12], which appears only to offer a non-terminal degree) graduate several students a year, even with a small number of full-time faculty (e.g., Polytechnic U.). Similarly, the number of master's degrees awarded in I/O Psychology at strong engineering schools ranges from 1 to 82.5 per year, even with a small number of full-time faculty working in the program (e.g., U. of Oklahoma, Villanova University). It is possible that more students would enroll if possible, but some schools limit their enrollments. For example, Missouri State University attempts to control their enrollment number of industrial/organizational master's students to between 10 and 15 students per year, increasing student demand for this proposed program.

In addition, more women than men are attracted to these master's programs. Excluding Saybrook, 68.8% of full-time and 80% of the part-time distance students are women.

[12] Saybrook is not a traditional program as an all on-line university with predominantly part-time faculty (n=85), taught in the "humanistic tradition" and a program for "self-directed learners" (SIOP website http://www.siop.org/gtp/gtpDisplay.asp?program=347), Saybrook graduates 43 doctoral students each year.

Similarly, 67.4% of the full-time and 83.8% of the part-time students at strong engineering schools are women. Similar percentages of enrolled women occur when only considering the psychology departments. Thus, it is anticipated that this program will help S&T's goal of attracting more female students.

Table 12: Listing of master's programs in I/O that are either on-line or at engineering schools. *Note*: FT=full-time, PT=part-time, M=male, F=female, T=Terminal, n-T=non-terminal, Yr=year.

	University	Enrollment				Degrees/Yr		No. of FT Faculty	Distance	Department / School
		Full-Time		Part-Time		T	n-T			
		M	F	M	F					
Distance Programs	Austin Peay State University	4	7	0	0	3.5	0	5	Yes	Psychology
	Aventis School of Management[1]	0	0	15	18	35	0	5	Yes	Management
	Baker College Online[1]	0	0	0	0	0	0	0[2]	Yes	Psychology
	Chicago School of Professional Psychology[3]	50	115	27	100	63	0	2	Yes	Psychology
	Colorado State U.(new May 2009) [4]	0	0	0	0	0	0	4	Yes	Psychology
	Fielding Graduate	17	41	47	94	38	0	5	Yes	Organization Mgt. & Dev.
	Kansas State U. [4]	11	22	0	0	13	0	2	Yes	Psychology
	Massachusetts School of Prof. Psychology	0	0	0	0	13	0	3	Yes	Psychology
	Polytechnic U. (NY)	5	15	2	8	15	0	2	Yes	Management
	Saybrook Graduate Schools & Research Ctr	179	369	0	0	0	22	13	Yes	Organizational Systems
	University of London	0	0	0	0	0	0	0	Yes	Birbeck College
	Clemson U. [4]	1	1	0	0	1	0	6	No	Psychology
	Florida Institute of Technology[4]	6	18	1	0	4	4	5	No	Psychology
	Florida International. U[4]	3	19	0	0	20	0	7	No	School of Business

Strong Engineering Schools	Illinois Institute of Technology[4]	4	8	0	0	0	0	5	No	Psychology
	Indiana U. – Purdue University Indianapolis	3	9	0	0	5	0	5	No	Psychology
	Louisiana Tech U. [4]	5	6	1	2	7	0	4	No	Psychology
	Macquarie U.	3[5]	27[5]	0	0	12-15[5]	0	3[6]	No	Psychology
	University of Alabama – Huntsville	4	6	0	0	6	0	6	No	Psychology
	University of Illinois – Urbana [4]	58	129	1	0	95	0	13	No	Labor & Employment Relations
	Univ. of Oklahoma[4]	1	2	0	0	2	5	4	No	Psychology
	Univ. of Philippines	2	5	7	64	1	0	9	No	Psychology
	Univ. of Waterloo[4]	2	4	0	0	2	1	4	No	Psychology
	Villanova Univ.	10	44	9	42	20	0	3	No	HR Develop.
	Wayne State U. [4]	0	0	8	11	18	0	1	No	Psychology

[1] New program since 2009
[2] Only adjunct faculty
[3] Offers PsyD
[4] Offers PhD
[5] Enrollment numbers are approximations acquired directly from the program director as the listing indicated zero enrollments
[6] Apparent number of faculty based on a review of their website (July, 2010).

Student Enrollment Projections

The following student enrollment projections over the first five years are based on the market and student demand. Initial enrollments are likely to come from current undergraduate students who are considering our graduate certificate programs to further their education either to enhance employment opportunities or to increase one's potential for admittance into a Ph.D. program, staff who are interested in pursuing this degree and are not enrolled in other programs, and personnel at Ft. Leonard Wood.

In Table 12, engineering schools without PhD programs in I/O psychology tend to enroll between 7-54 full-time students each year and between 0 and 71 part-time students. During a session on I/O master's programs at the 2011 SIOP conference, individuals at Missouri State University, Middle Tennessee State University, and others reported that they enroll 12 to 15 full-time, on-campus students each year. These data correspond to a recent SIOP survey of graduate programs in psychology that found the mean number of students applying to master's programs (excluding distance programs) to be about 56

(range: 2-300), with a mean number of 20 (range: 2-95) students who are accepted and a mean of 12 (range: 0-57) students who eventually attend.[13]

The SIOP survey data also indicated that I/O master's programs graduate, on average, 11 (range: 1-40) students per year.[14]

The following numbers (Table 13) are based on the projection that two students will enroll part-time and two students will enroll full-time in the first year. In subsequent years, it is anticipated that part-time students will graduate after three years and full-time students will graduate in two years. Finally, it is conservatively estimated both full-time and part-time student enrollments will increase by one student each year each successive year (e.g., $n_2=n_1+1$).

Form SE
Student Enrollment Projections

Table 13: Student Enrollment Projections Based on Market and Student Demand

YEAR	**1**	**2**	**3**	**4**	**5**
FULL-TIME	2	5	7	9	11
PART-TIME	3	7	12	15	18
TOTAL	**5**	**12**	**19**	**24**	**29**

Projected Number of New Students

It is anticipated that the majority of students enrolling in the proposed program will represent additional students to S&T. That is, either they will be new to campus, or will be graduates of an S&T bachelor's program who would not have entered another master's program at S&T. The pool of students enrolling in the program is projected to consist of graduates of psychology programs offered by other campuses; graduates of S&T's Psychology program; graduates of other S&T programs who have a minor in psychology; servicemen, women, or family members from Fort Leonard Wood; and on-campus staff who have a desire to enroll in the program. It is likely that very few (if any) of students enrolled in the engineering management or systems engineering master's programs will switch to the MS I/O Psychology program. Considering these sources, it is anticipated that 80% or more of the students would be new to campus.

[13] Tett, Walser, Brown, Simonet, & Tonidandel (2013). The 2011 SIOP I-O psychology graduate program benchmarking survey part 2: Admissions, standards, and processes, *The Industrial-Organizational Psychologist, 50*(3), 13-32.
[14] Tett, Brown, Walser, Simonet, Davis, Tonidandel, & Hebl (2012). The 2011 SIOP I-O psychology graduate program benchmarking survey: Overview and selected norms, *The Industrial-Organizational Psychologist, 50*(2), 25-37.

3.B. Financial Projections

The majority of resources to complete development and implementation of the I/O Master's degree in Psychology already exist at Missouri S&T. The collaborating units of Psychological Science, Business and Information Technology, Mathematics and Statistics, and Engineering Management and Systems Engineering offer all but two of the courses (Personnel Selection and Advanced Research Methods) in the proposed master's program. These two courses are assigned and scheduled for future semesters; however, since many of the I/O courses are currently only offered once every two years, an additional faculty member will be added in the future to allow more frequent offerings. Even without the added faculty member, existing faculty in these departments have the training, experience, and skills in teaching, research, and service to fully staff an I/O psychology master's degree program. Because these essential elements exist already, expenses to implement the program and position it for growth are minimal. The proposed program has been developed with the full support of the collaborating units (Appendix A).

3.B.1. Additional Resources Needed

A new faculty member will be recruited ($4,000 estimate) to begin at the start of the second year to meet the need and demand to offer courses once a year, as opposed to once every two years. Recruitment costs are considered a one-time expense in year one.

This new faculty member will contribute at least 75% of his or her time to our growing undergraduate program, as most current faculty members will do. At most, this faculty member would offer 2 graduate courses along with 4 undergraduate courses per year. As graduate students can take several of our undergraduate courses for graduate credit, a conservative estimate is that the new faculty member will spend 33% of effort toward graduate and the remaining 67% going toward the undergraduate education. The faculty salary is estimated at 33% of a $70,000 (high estimate) per year starting salary. Pay raises are calculated at 2% for each successive year. Benefits are calculated at the standard university rate.

The new faculty member will need a research lab. It is possible that a new research area will be needed, but use of a current lab could be sufficient with minor or no renovations. The cost for a new or renovated space is included in the financial projection, but may not be necessary.

Given the new faculty member's research program the research needs could vary. At a minimum, the individual will need several computers for data collection and analysis. This would be the major equipment needed. There are no expected library or consultant costs. Currently, it is possible to access electronically the journals needed and psychology faculty generally do not work with consultants unless it is on grant or contract work. If it were grant or contract work, the consultant costs would be written into the proposal.

There is a likely need for sophisticated software for simulations or specialized statistical analyses. The estimated $2,000 cost per year for this software should be more than sufficient. There will be minimal costs for marketing the program, but $500 is included to cover any incurred costs.

Finally, there are no anticipated staff expenses as the monitoring of the program will be the service responsibility of one of the I/O faculty members and the processing of the student paperwork will be the responsibility of the departmental administrative assistant. This should not overburden either of these positions within the first five years. If there is substantially greater growth in the program than projected, a staff position could be requested at that time.

Other recurring expenses would include the need for printing promotional materials to distribute at various conferences. There are no other anticipated costs such as for the library, as most of the materials are accessible on-line.

3.B.2. Revenue

At this point, the only anticipated revenue will be from student tuition and fees. The revenue generated from distance or out-of-state students would be more. Therefore, these projections are conservative estimates.

Additional revenues are likely through grants and contracts, but income from these sources has not been entered into the budget because they are not secured. Psychological Science faculty members have had successful research grants and contracts in the area of Industrial/Organizational Psychology compared to other humanities and social sciences programs at Missouri S&T. The MS in I/O Psychology degree further expands access to state and federal grants and it will afford increased collaboration across the participating departments.

3.B.3. Net Revenue

As indicated in Table 14, the conservative estimates indicate that the program should become financially and academically viable at the end of year five with a total of 29 students (11 full-time and 18 part-time). This number is reasonable, because an average of 12 admitted students generally attend the program each semester (Tett et al., 2013).[15] The greatest expense occurs in year 2 when a new faculty member is acquired (see Table 15). The salary of the new faculty and the faculty member's research space, in particular, would be the greatest expense. The Department of Psychological Science is willing to contribute $20,000 to help offset the cost to renovate or build a lab for the new I/O psychologist. The other departments have indicated that there is room in their programs for these additional students and they do not need additional faculty to support this program (see Appendix A). Given these estimates, the total revenue across the five years

[15] Tett, Brown, Walser, Simonet, Davis, Tonidandel, & Hebl (2012). The 2011 SIOP I-O psychology graduate program benchmarking survey: Overview and selected norms, *The Industrial-Organizational Psychologist, 50*(2), 25-37

is estimated to be $268,549 and the total expenses are estimated to be $230,775, with a net revenue of $ 37,773. If we attract more full-time and distance students, the net gain will be greater.

Form FP
Financial Projections

Table 14: Enrollment at the End of Year 5 for the Program to Be Financially and Academically Viable.

Enrollment Status	Full-Time	Part-Time	Total
Number of Students	**11**	**18**	**29**

Table 15: Financial Projections for Proposed Program for Years 1 Through 5.

	Year 1	Year 2	Year 3	Year 4	Year 5
1. Expenses per year					
A. One-time					
New/Renovated Space	0	69,800	0	0	0
Equipment	0	5,000	0	0	0
Library	0	0	0	0	0
Consultants	0	0	0	0	0
Other: Recruiting, Marketing, Software	6,500	2,500	2,500	2,500	2,500
Total one-time	6,500	77,300	2,500	2,500	2,500
B. Recurring					
Faculty	0	23,100	23,562	24,033	24,514
Staff	0	0	0	0	0
Benefits	0	7,700	8,200	8,400	8,500
Equipment	0	0	0	0	0
Library	0	0	0	0	0
Operating expense	0	990	990	990	990
Total recurring	0	31,790	35,254	35,925	36,506
Total expenses	6,500	109,090	37,754	38,425	39,006
2. Revenue per year					
Tuition/Fees	11,499	31,791	52,007	68,115	85,136
Institutional Resources	0	20,000[a]	0	0	0
State Aid -- CBHE	0	0	0	0	0
State Aid -- Other	0	0	0	0	0
Total revenue	11,499	51,791	52,007	68,115	85,136

3. Net revenue (loss) per year	4,999	(57,299)	14,253	29,690	46,130
4. Cumulative revenue (loss)	4,999	(52,300)	(38,047)	(8,357)	37,773
[a] The Department of Psychological Science is willing to contribute $5000 to help offset the cost to renovate or build a lab for the new I/O psychologist.					

3.C. Business and Marketing Plan: Recruiting and Retaining Students

Initial Marketing Plan

The proposed **Master of Science degree in Industrial/Organizational Psychology** program offers an additional option to retain existing students who wish to continue their studies at Missouri S&T, but must currently look elsewhere because their desired degree option does not exist at S&T. Informal discussions of the proposed Master of Science in I/O Psychology program have generated interest among Missouri S&T students, as well as staff. A good number of students at Missouri S&T plan to pursue graduate education either at S&T or elsewhere. The percent of graduating seniors who indicated that there was a very good chance they would attend graduate school was 78% in May 2008, 76% in May 2009, 63% in May 2010, and 66% in May 2011 (data from the Office of Enrollment Management). In addition, Sri Lankan students are looking for graduate studies in the US and several are interested in I/O psychology.

Other potential students are part of the population at Ft. Leonard Wood. As indicated earlier, an October 2008 survey of 26 individuals attending a MANPRINT (the US Army's Human Systems Integration Directorate) course at Ft. Leonard Wood revealed that a majority (73%) of these individuals would be interested in this program (see Appendix F). In addition, workers at Ft. Leonard Wood could use this program for professional development.

To tap into the S&T and Ft. Leonard Wood markets, the initial marketing plan would include mailings (electronic and regular) to current undergraduate students and former students, notices sent to Ft. Leonard Wood, and a web page. In particular, students enrolled in the existing graduate certificate programs will be informed of the new **Industrial/Organizational Psychology Master of Science** program via e-mail. Also, all Missouri S&T juniors and seniors (typically about 55 students), and those who have graduated from the department of psychological science at Missouri S&T with a G.P.A. of 3.0 or higher will be sent e-mails describing the new program. Fliers describing the program also will be developed for distribution across campus as well as for distribution to individuals working at Ft. Leonard Wood. Similar materials could be distributed to students in our Sri Lankan program.

Most of these recruitment plans are already implemented for promoting the undergraduate program. In addition, the current Administrative Assistant is adept at creating and updating our web site and would develop and maintain a new web page dedicated to the program. Hence, the cost to recruitment should be minimal, as the work

will be absorbed by existing staff as part of their routine duties. In addition, fliers will be distributed at various conferences when possible.

Developed Marketing Plan

The expanded marketing plan will continue to target S&T students and staff and individuals working at Ft. Leonard Wood, but also target other undergraduate students, professionals working in human resources, and employees from various corporations and government agencies. The overarching recruitment goal is to obtain a highly qualified student body that is diverse across traditional and non-traditional student categories, discipline area, age, gender, race, and ethnicity. Students are often unaware of the field of Industrial/Organizational Psychology and/or the opportunities afforded by a master's degree in this area. Recruitment methods will serve to educate students about this field. An introduction letter describing the new program along with several fliers about the program will be sent to psychology departments within the state of Missouri. The demand for the program is expected to increase after the recruitment plan is implemented because student awareness of the program should increase dramatically.

The full recruitment effort will continue with mailings (electronic and regular) to current and former S&T undergraduate students, S&T staff, as well as fliers distributed at various conferences, notices sent to Ft. Leonard Wood, and a web page. To reach beyond this target audience, the Department of Psychological Science will work closely with our Admissions Counselors to inform high school students of the program. The admissions counselors have helped us build and grow our undergraduate program and the graduate admissions counselors have worked hard to help us inform others about our graduate certificate programs. Therefore, besides the development of materials, the marketing costs should be minimal as these processes are already in place. The recruitment methods for high school and traditional undergraduate students will include:

- Presentation/attendance at college fairs throughout Missouri
- Email correspondence
- Direct mail involving invitations and brochures of the program
- Degree-specific website that includes web-based services
- Paragraphs about, and links to, the MS in I/O program in collaborating academic websites
- Posting the program on the SIOP graduate program website.

Other marketing strategies will include distributing fliers and promoting the program at annual SIOP conferences, the Human Factors and Ergonomics Society, the American Psychological Association, and the Association for Psychological Science. Promoting the program at the American Psychological Association and the Association for Psychological Science annual conferences is important in order to reach a broader audience and faculty who teach in undergraduate only programs.

The published materials about the MS in I/O Psychology degree (including websites) will highlight the unique combination of resources that contribute to this degree, the multiple

avenues to degree completion, and the nature of the three specialization emphasis areas that a student might pursue.

A communication campaign using direct mail publications, email, and a degree-specific website will be developed. The campaign will emphasize the advantages of Missouri S&T's **Industrial/Organizational Psychology Master of Science Program** degree with its focus on today's changing technological society. Each communiqué will feature the benefits of the new program.

Marketing Cost Estimates

As indicated above, many of the tasks involved in our marketing plan will be absorbed by current processes and personnel as part of their routine duties. The marketing costs should be minimal, but $500 per year is budgeted for developing brochures, other materials, or mailings, as needed.

Student Retention Plans

Student retention is a major goal of the MS in I/O Psychology program. One of the current faculty members will serve as the full-time advisor for the program, but the department chair will be the initial advisor. The advisor will be responsible for all new student inquiries and new student advising, including initial course enrollment. The teaching load (number of courses) of the faculty will not increase, but each faculty member is expected to have a slight increase in advising load, which would not exceed a normal advising load.

Upon admittance to the program, students will be assigned the faculty advisor from the Department of Psychological Science. The faculty advisor will guide students through course selection, monitor their progress toward completing graduation requirements, and provide information and advice on post-graduation employment. Students will also be advised and encouraged to utilize the academic and career support services offered by Missouri S&T. High quality developmental advising, dedicated resources, and excellent instruction, should help the students achieve their educational and employment goals, which should help attract and retain students.

Plans to Ensure Program Enrollment Outcomes Achieved

To create an awareness of and interest in our program, the marketing materials must be reviewed annually, if not initially biannually, to ensure that the description of the program and the contact information are accurate. Also, the department chair of Psychological Science will work closely with admissions counselors for undergraduate and graduate students to ensure they have the up-to-date information about the program.

Once students begin to inquire about the program, response letters (or phone calls, if appropriate) will be made to the prospective students. These students will be invited to visit campus or to contact the department chair for further information.

After students apply, further contact with prospective students will include a congratulations note on his or her acceptance. These communications will coincide with the process the Office of Graduate Studies currently follows. Also, the offer of any financial assistance will be addressed as early as possible to encourage the student to attend.

After being enrolled, faculty will take care in advising students so as to promote their successful completion of the program. Each of these steps should lead to the desired program enrollment numbers.

4. Institutional Capacity

There is interest in the graduate certificate programs, but these programs are under enrolled. As these courses are a part of the MS program, there is plenty of room to grow this program.

Form PG
Program Characteristic

5. PROGRAM CHARACTERISTICS

5.A. Structure

Overview

The proposed I/O Master's program involves courses from the Departments of Psychological Science, Mathematics and Statistics, Business and Information Technology, and Engineering Management and Systems Engineering. This program will allow students to divide their work among core courses offered by the Department of Psychological Science; methods courses offered by the Departments of Psychological Science and Mathematics and Statistics, and specialization emphases in one of three areas: Human Factors, Leadership in Technical Organizations, or Psychometrics. These specializations emphases are non-thesis programs, but a thesis is optional. There also is the thesis option without a specialization area. Similarly, the completion of an internship is optional for all students. Students may complete this program with a minimum of 36 hours; however, if they opt to complete a non-required thesis additional hours will be required. These additional hours are reasonable, as several I/O master's programs that require an internship and thesis generally require their students to complete 43-48 credit hours for program completion (2011 SIOP conference session on I/O master's programs).

The minimum of 36 credit hours required does allow the students to develop the competencies that the *Guidelines for education and training at the master's level in industrial-organizational psychology* (SIOP 1994, retrieved June 24, 2011, from http://www.siop.org/guidelines.aspx) articulate students should acquire. The *Guidelines* do not specify that a thesis is required nor do they specify *how* these competencies should

be developed. Supervised experiences such as internships are one means of teaching these competencies, but other means include course work, on-the-job training, independent study, and observation (http://www.siop.org/guidelines.aspx). Assessment of these competences is addressed in 5.F.

Form PS
Program Structure Form

1. **Total credits required for graduation:** Minimum of 36 hours

2. **Residency requirements, if any:** There is no residency requirement; however, a student may transfer a maximum of six credit hours into the program.

3. **General Education Prerequisites:**

Entering students will be required to have prerequisite skills equivalent to those required to study at the graduate level. In addition, students should have had statistics, general psychology, research methods, and three of the following six courses prior to entering the program. Course descriptions are in Appendix G.

Psych 305 Cognitive Psychology
Psych 308 Social Psychology
Psych 330 Neuroscience
Psych 340 Sensation and Perception
Psych 360 Personality Theory
Psych 362 Abnormal Psychology

Students not meeting this requirement may be considered for admission, but will be expected to complete this requirement at Missouri S&T during the course of their graduate studies. Completing this requirement does not count toward the 36-hour M.S. Degree requirement. As per one of our support letters (Appendix B), students with a non-psychology background would be encouraged to take Psych 308, 340, and 360.

4. **Major requirements:** Core (15 hours), Methods (9 hours), Specialization Emphasis (9 hours), and Electives (3 hours) (see Appendix H for course descriptions)

Core Courses (15 hours, select 5 of 6 courses)

Course	Hrs
Psych 307 Industrial Psychology	3
Psych 316 Psychology of Leadership	3
Psych 372 Group Dynamics	3
Psych 374 Organizational Psychology	3
Psych 407* Personnel Selection	3
Psych 410 Seminar in Industrial/Organizational Psychology (taught as Psych 401 in fall 2009, fall 2011)	3

*Planned course number. Will be offered initially as Psych 401.

Methods Courses (9 hours)

Course	Hrs
Stat 353 Statistical Data Analysis	3
Psych 403 Psychometrics	3

Advisor designates (e.g., Psych 440* Advanced Research Methods (new course scheduled for fall 2014) or Stat. 444 Design and Analysis of Experiments)	3

*Planned course number. Will be offered initially as Psych 401.

Specialization Emphasis Courses (9 hours of which 3 hours must be 400 level)
Human Factors (non-thesis):

Course	Hrs
Psych 311 Human Factors	3
Psych 314 Human-Computer Interaction	3
Psych 315 Environmental Psychology	3
Psych 490* Research (additional hours)	3-6
Psych 491* Internship (additional hours)	3-6
EMgt 380 Work Design (offered infrequently)	3
EMgt 386 Safety Engineering	3
EMgt 411 Human Systems Integration	3
EMgt 456 Advanced Personnel Management	3
ERP 346 Enterprise Resource Planning Systems	3
ERP 347 Supply Chain Management Systems	3
ERP 348 Strategic Enterprise Management Systems	3
IST 385 Human-Computer Interaction	3
IST 386 Human-Computer Interactions Prototyping	3
IST 387 Human-Computer Interaction Evaluation	3
IST 480 Web and New Media Studies	3
IST 487 Research Methods in Human Computer Interaction	3

*Planned course number. Will be offered initially as Psych 401.

Leadership in Technical Organizations emphasis (non-thesis):

Course	Hrs
Psych 370 Advanced Social Psychology	3
Psych 378 Social Influence	3
Psych 380 Cross Cultural Psychology	3
Psych 418** Leadership for Engineers	3
Psych 490* Research (additional hours)	3-6
Psych 491* Internship (additional hours)	3-6
EMgt 313 Managerial Decision Making	3
EMgt 327 Legal Environment	3
EMgt 420 Technological Innovation Management	3
EMgt 456 Advanced Personnel Management	3
IST 351 Leadership in Technology Based Organizations	3
IST 368 Law & Ethics in E-Commerce	3

*Planned course number. Will be offered initially as Psych 401.
**Course co-taught by Psychological Science and Engineering Management and Systems Engineering Departments

Psychometrics emphasis (non-thesis):

Course	Hrs
Psych 364 Tests and Measurements	3
Psych 490* Research (additional hours)	3-6
Psych 491* Internship (additional hours)	3-6
Stat 343 Probability and Statistics	3
Stat 344 Mathematical Statistics	3
Stat 346 Regression Analysis	3
Stat 444 Research Design	3
Stat 445 Multivariate Statistics	3
Stat 453 Linear Statistical Models I	3
Stat 454 Linear Statistical Models II	3

*Planned course number. Will be offered initially as Psych 401.

Thesis Option:
Students who seek admission to Ph.D. programs upon completion of their M.S should consider the thesis option. Students completing a thesis would need to complete the following

Course	Hrs
300- or 400-level Psychology, EMgt, IST, or Statistics pertaining to thesis topic (to be approved by student's academic advisor)	3
Psych 490* Research (Thesis credit)	6
Psych 491* Internship (additional hours)	3-6

*Planned course number. Will be offered initially as Psych 401.

5. **Free electives credits:** The students need to take 3 hours of electives from within any of the three specialization emphasis areas.

6. **Requirements for thesis or internship experience:** Students in one of the three specialization emphasis areas are not required to complete a thesis. There is a thesis option, which requires the completion of a thesis. The thesis will be a research project on an I/O topic selected by the student in consultation with his or her advisor. Students in one of the specialization areas may complete a thesis, but it will require hours beyond the minimum of 36 credit hours. Internships will be established and encouraged, but not required of the students and also will require hours beyond the minimum of 36 credit hours.

7. **Unique Features:**

The proposed program is designed to provide students with a choice of specialization in Human Factors, Leadership in Technological Organizations, or Psychometrics. Students can also take a course in cross-cultural psychology and thus add a multi-cultural component to their degree. Students completing this degree will have a strong

background that prepares them for work in a variety of organizations including engineering and technically oriented settings. Moreover, the program involves the interdisciplinary cooperation of three other departments on campus with the Department of Psychological Science. Finally, as many of these courses are offered via distance education, students will have the option of completing the master's via distance.

Detailed Descriptions of New Courses (see Appendix H for descriptions of all courses)

Core Courses, Methods Courses and Courses Common to Specialty Areas:

Psych. 440* Advanced Research Methods (LEC 3.0) Advanced techniques class, including advanced analysis of variance, multiple regression, multiple and partial correlation, analysis of covariance and the examination of some quasi-research designs.

Psych 490* Research (IND 0-9.0) Investigations of an advanced nature leading to the preparation of a thesis or the students apply methodological and content knowledge to a research project designed by the advisor. Consent of instructor required.

Psych 491* Internship (IND 0-6.0) Students will apply critical thinking skills and discipline specific knowledge in a work setting based on a project designed by the advisor and employee. Activities will vary depending on the student's background and the setting. Requires a major report. Prerequisite: Completed Core and Methods courses, instructor consent.

Human Factors:
Psych 493* Oral Examination (IND 0.0) After completion of all other program requirements, oral examinations for on-campus M.S. students may be processed during intersession. Off-campus M.S. students must be enrolled in oral examination and must have paid an oral examination fee at the time of the defense / comprehensive examinations (oral / written). All other students must enroll for credit commensurate with uses made of facilities and/or faculties. In no case shall this be for less than three (3) semester hours for resident students.

Leadership in Technical Organizations:

Psych 407* Personnel Selection (LEC 3.0) Developing and using assessment tools for personnel selection, classification, and promotion; measuring the impact of cultural variables on test performance; early identification of managerial potential; and emphasis on alternatives to cognitive abilities testing, including physical fitness and personality assessment.

Psychometrics and Thesis Option: No additional courses needed.**

*Planned course number. Currently offered or will be offered initially as Psych 401 Topics.
**The Thesis Option is highly recommended for students who plan to seek admission to Ph.D. programs upon completion of their M.S.

5.B. Faculty and Administration

Faculty Responsible for Program Success (and percent time)

Dr. Nancy J. Stone, chair of the Department of Psychological Science, will be responsible for the success of this program. Many of the duties (e.g., marketing) will be integrated into her current marketing strategies for the current programs (e.g., attending open houses, graduate fair for the graduate certificates) representing approximately 10% of her time.

How Instructional Needs Met/Faculty Teaching or Advising (and percent time)

Dr Nathan Weidner, an I/O psychologist hired fall 2012, teaches Psych 307 Industrial Psychology, Psych 374 Organizational Psychology, Psych 316 Psychology of Leadership in Organizations, and Psych 364 Tests and Measurements. These courses are all part of the proposed master's program. In addition, the department chair has a background in I/O psychology and human factors. She has taught Psych 410 Seminar in I/O Psychology and is scheduled to develop and teach Psych 440 Advanced Research Methods. Two additional courses have already been developed by other faculty and are currently being taught (Psych 418: Leadership for Engineers, Psych 403: Psychometrics). Therefore, the teaching loads will increase somewhat with slightly higher enrollments, but not beyond expected teaching loads for the faculty (e.g., student contact hours or faculty development programs).

Table 15 lists who is currently scheduled to teach the new graduate courses and when. Psych 490 Thesis is not listed given that the number of thesis students is anticipated to be low, initially; however, all I/O faculty members could serve as thesis advisors. Given the current number of faculty, several of these courses can only be offered once every two years. An additional I/O psychology faculty member to be hired in the second year of the program will allow us to offer these courses every year, to graduate students on time, and provide additional graduate advisors to supervise theses. As our focus has been primarily undergraduate education, each faculty member teaches three courses per semester. This course load is not anticipated to change with the implementation of the master's program. The new faculty member will contribute to the teaching of undergraduate courses, teaching at most two graduate courses along with four undergraduate courses each year.

Table 15: Proposed offerings of new graduate courses.

	Fall 2013	Spring 2014	Fall 2014	Spring 2015
Psych 403	--	Dr. Sharpsteen	--	--
Psych 407	--	--	Dr Weidner	--
Psych 410	Dr. Stone	--	--	--
Psych 440	--	--	Dr. Stone	--

Expectations for professional activities and teaching/learning innovation are consistent with what faculty associated with the program are already doing (e.g., conducting

research, presenting at conferences) and several of the faculty are learning the art of distance education.

Given that the faculty in the Department of Psychological Science will not teach more than one graduate course a semester, their teaching load dedicated to the graduate program will be minimal. The faculty who will be advising the graduate students will be the I/O psychologists and possibly the social psychologists (asterisked in the list below). The percent of time teaching or advising within the graduate program is estimated at 15% to 25% of their time. Faculty in the other departments are not likely to advise these students and the other departments have indicated that there is room in their current programs and courses for additional students (see Appendix A). Therefore, their teaching or advising time should not change substantially.

Listing of Faculty to teach the Industrial/Organizational Psychology Courses

Psychological Science (*likely advisor for graduate students)

Robert Montgomery, *Chancellor's Professor*, Ph.D. (Oklahoma State University) - Organizational behavior; leadership; persuasion; group dynamics; research design, measurement, evaluation research; personality and success; personnel selection.

Jennifer Pattershall-Geide*, *Assistant Professor*, Ph.D. (University of Arkansas) - social psychology, motivation and goal directed behavior, emotion, social cognition, and the interplay of these processes.

Don Sharpsteen*, *Associate Professor*, Ph.D. (University of Denver) - Social and personality psychology; psychometrics; social cognition; close relationships; romantic jealousy; gossiping; intimacy in friendships.

Nancy J. Stone*, *Professor and Chair*, Ph.D. (Texas Tech University) – Industrial and organizational psychology; human factors; group processes, team work, and distributed teams; research design and statistics; program evaluation; interview process.

Nathan Weidner*, *Assistant Professor*, Ph.D. (Wayne State University) - Industrial-organizational psychology, implicit theories of leadership and motivation, stress and health outcomes in the workplace, technology in the classroom to aid student learning outcomes.

New I/O Psychology faculty (starting second year of program)*

Business and Information Technology (see Appendix I for a listing of BIT faculty)

Mathematics and Statistics (see Appendix I for a listing of Mathematics & Statistics faculty)

Engineering Management and Systems Engineering (see Appendix I for a listing of EMSE faculty)

Special Requirements for Teaching in Program

Faculty (regular, full-time, or adjunct) are expected to have a Ph.D. in the discipline relevant to the course being taught and to meet the requirements of Graduate Faculty status as described by the Missouri University of Science and Technology.

Percent of Credit Hours Assigned to Full-Time Faculty

As there are no part-time faculty in the Psychological Science Department, 100% of the psychology courses will be taught by full-time faculty. While supporting departments may employ part-time faculty, these faculty typically do not teach upper-level courses. Thus, it is anticipated that all of the courses taken for the degree will be taught by full-time faculty.

Expectations for Faculty Involvement in Professional Activities, Special Student Contact, Teaching /Learning Innovation.

Faculty will still be expected to maintain an active research program and to be involved in their professional organizations. Even though thesis students will need additional advising time, the number of thesis students should not be excessive whereby the faculty workload should not extend beyond what is normally expected. Further, faculty are encouraged to develop courses that can be taught via distance. This enables us to offer the program via distance and educational technology will help faculty enhance their courses.

5.C. Student Preparation

Recommended Preparation for Incoming Students

Entering students will be required to have prerequisite skills equivalent to those required to study at the graduate level. In addition, students should have had statistics, general psychology, research methods, and three of the following six courses prior to entering the program.

Psych 305 Cognitive Psychology
Psych 308 Social Psychology
Psych 330 Neuroscience
Psych 340 Sensation and Perception
Psych 360 Personality Theory
Psych 362 Abnormal Psychology

Students not meeting this requirement may be considered for admission, but will be expected to complete this requirement at Missouri S&T during the course of their

graduate studies. Completing this requirement does not count toward the 36 hour M.S. degree requirement.

Students wishing to complete the Psychometrics emphasis should have taken a basic course in probability and statistics. In addition they should have a strong algebra and calculus background. Familiarity with matrices and vectors would be beneficial.

Special Admissions Procedures or Student Qualifications Required (beyond regular admission standards)

Students seeking admission to the **Industrial/Organizational Psychology Master of Science Program** will be required to have an undergraduate degree with a minimum G.P.A. of 3.0 from an accredited college or university. A maximum of six hours of graduate work, if appropriate, may be transferred from other colleges or universities into the MS program. Candidates will be required to take the Graduate Record Examination and to meet the existing University requirements for admission. Students will also be expected to have the required coursework specified above. Students not meeting this coursework requirement may be considered for admission, but will be expected to complete this coursework in addition to the master's program's course of study. Completing this coursework will not count toward the 36-hour M.S. degree requirement.

Characteristics of Specific Population Served

Initially, the specific population served will likely be professionals working at Ft. Leonard Wood, engineering professionals (recent graduates or working professionals), psychology graduates, and engineering graduates desiring to work in management. The working professionals at Ft. Leonard Wood are likely to have time constraints on when they can take classes and how long they are living in the area. These individuals might be better served with our on-line courses. In addition, if the working professionals at Ft. Leonard Wood are predominantly trained in engineering, these individuals might require more "bridge" courses before commencing the I/O master's program. Many engineering professionals and recent S&T graduates, however, may have a number of psychology courses, as engineering students often acquire a minor in psychology.

Over time, while retaining the engineering and working professionals in the program, we should begin to see an increase in psychology graduates applying to the program. Whether from S&T or other programs, these students should be appropriately prepared to begin the program.

5.D. Program Outcomes

Learning Outcomes

Increasingly, people factors are recognized as a major determinant of organizational performance and as a key competitive differential. Graduates of the Missouri S&T's **Industrial /Organizational Psychology Master of Science** degree program will be able to provide important advice with regard to a variety of the people factors critical for creating and maintaining a maximally effective organization. Assessment of student outcomes is addressed in 5.F and 5.G.

Using the competency-based training model in SIOP's *Guidelines* for graduate training in I/O psychology (http://www.siop.org/guidelines.aspx),

1. Students in all emphasis areas or the thesis option should be aware of the **Core Psychological Domains** given the prerequisites for the program (undergraduate education may contribute) and the required Core Courses.
2. Students in all emphasis areas or the thesis option should be knowledgeable of the **Data Collection and Analysis Skills** given the prerequisites for the program and the required Methods Courses.
3. Students in all emphasis areas or the thesis option will have knowledge of various **Core Industrial / Organizational Domains** and, depending on the specialization emphasis or the thesis option, students will have varying levels of other Core Domains.

These competencies are outlined in greater detail in Appendix J.

Students in the various emphasis areas will acquire greater exposure and training in various competences, as indicated below and in Appendix J.

a. Students in the Leadership in Technical Organizations emphasis will have a greater understanding of job and task analyses; employee selection, placement, and classification; and leadership and decision making
b. Students in the Psychometrics emphasis will have a greater knowledge of research and statistical methods as well as the statistical and data analyses.
c. Students in the Human Factors Emphasis will gain knowledge in the Human Performance/Human Factors additional domain.
d. Students who select the thesis option will have a greater understanding of research methods and statistical analyses in an I/O topic of their choosing.

Specific Skills of Graduates

All students should be able to

1. conduct a job and task analysis;
2. select and develop criterion measures;
3. develop a selection program, which includes an evaluation phase;
4. develop a training program, which includes an evaluation phase;

5. develop a performance appraisal program, which includes an evaluation phase;
6. identify appropriate motivational strategies for a particular situation;
7. identify the measures and determinants of work attitudes for current worker attitudes;
8. identify the leadership, power, and decision making styles and strategies that are impacting group effectiveness;
9. identify the current organizational structure and how it can affect organizational effectiveness;
10. identify strategies of change for different levels of the organization (individual, group, organization).

Students in the Human Factors non-thesis emphasis

1. will be able to identify potential problems within a work environment,
2. will be able to make suggestions for improvement to this work environment.

Students in the Leadership in Technical Organizations non-thesis emphasis

1. will be able to identify managerial and leadership decision making strategies in technological organizations
2. will be able to identify ways to motivate workers in technological and scientific work environments.

Students in the Psychometrics non-thesis emphasis

1. will be able to test measures appropriately for sound psychometric properties (e.g., reliability, validity)
2. will be able to conduct a variety of statistical methods (e.g., regression analysis, multivariate statistics)
3. will be able to use various statistical packages proficiently.

Students who select the thesis option

1. will be able to conduct quality research independently
2. will be able to evaluate other research critically
3. will be able to succeed in a psychology graduate program.

In summary, I/O Psychologists, in general, help organizations define strategies, set policies, and implement practices involving the performance and well-being of people at work. These psychologists apply the rigor and methods of psychological science to issues of critical relevance to business and other work organizations. Graduates of the Missouri S&T **Industrial / Organizational Psychology Master of Science** degree program will have the skills needed to help management make effective decisions regarding talent within organizations, including the assessment of people for selection and placement into jobs; development of effective training programs; strategies for organizational development; measurement of performance; and ways to promote quality of work-life. A human factors option in the program will enable graduates to acquire skills to be able to deal with a variety of human performance issues in many settings, including technological environments (e.g., workload, fatigue, situational awareness, usability of equipment, attention, human reliability, stress, visualization of data,

individual differences, accessibility, safety, human error, and decision making). Moreover, an emphasis in psychometrics will provide graduates with the background to measure knowledge, skills, abilities, and personality characteristics of people for a variety of employment-related purposes (e.g., selection for promotion, training and development, and assessment of employee morale, job satisfaction, and attitudes towards management or customers).

5.E. Program Design and Content

Process of Program Design to Meet Program Outcomes

The program is built upon a strong undergraduate psychology program that emphasizes industrial/organizational psychology, the psychology of leadership, social psychology, and research methods. Therefore, many of the courses and faculty necessary for an I/O psychology master's program already exist. To enhance the program, graduate certificate programs were developed with the collaborating departments: Mathematics and Statistics, Engineering Management and Systems Engineering, and Business and Information Technology. In addition, the program was aligned with SIOP's *Guidelines for Education and Training at the Master's Level in Industrial-Organizational Psychology* (http://www.siop.org/guidelines.aspx)

Sequence of Courses (note prerequisite sequences & rationale for each sequence)

If necessary, the student should begin with any prerequisite courses required for program admittance. Next, the student should pursue the Core and Methods courses. These courses may be taken together; however, these courses should be complete or nearly complete before the students begin the specialty emphasis courses. The Core and Methods courses will give the student essential competencies on which the courses in the specialty emphases should build.

If the student desires to complete a thesis in addition to a specialization emphasis, this should begin after the student has completed or nearly completed the coursework in that specific emphasis. This will give the student an even stronger foundation on which to develop the thesis topic and the time necessary to devote to a thesis.

Students completing the thesis option should begin work on the thesis after completion, or near completion, of the Core and Methods courses. The one course required of those completing the thesis option could be taken during the first semester of the thesis research.

Students who desire to complete an internship should have completed all of the degree coursework to ensure the student has the requisite skills for satisfactory completion of the internship. In some situations it may be possible for the student to participate in an internship while also completing emphasis coursework; however, this should not exceed more than two courses remaining for degree completion.

Internship and the thesis should not be completed simultaneously.

New Course Descriptions and Learning Outcomes

The two courses that need to be developed are Psych 407 Personnel Selection and Psych 440 Advanced Research Methods. Below are the course descriptions. The learning outcomes follow the descriptions.

Psych 407 Personnel Selection (LEC 3.0) Developing and using assessment tools for personnel selection, classification, and promotion; measuring the impact of cultural variables on test performance; early identification of managerial potential; and emphasis on alternatives to cognitive abilities testing, including physical fitness and personality assessment. Expected Learning Outcomes: Students should be proficient in the use of cognitive, personality, and performance (physical ability) assessment tools; should be knowledgeable in the appropriate use of each test with respect to the job analysis data; and should understand how test performance may be affected by cultural variables.

Psych 440 Advanced Research Methods (LEC 3.0) Advanced techniques class, including advanced analysis of variance, multiple regression, multiple and partial correlation, analysis of covariance and the examination of some quasi-research-designs. Expected Learning Outcomes: Students should be proficient in the use of advanced analysis of variance, multiple regression, multiple and partial correlation, and analysis of covariance. Students should be familiar with other forms of analyses such as factor analysis, hierarchical linear regression, and meta-analysis. Students should understand what research design factors or variables influence the determination of what analyses are most appropriate.

5.F. Program Goals and Assessment

Learning Outcomes Assessment Process

Student learning outcomes were presented in 5D. The assessment of these learning outcomes will be conducted within the respective courses that link to these outcomes by evaluating students' performances. We will begin with the faculty rating the student outcomes on a 5-point Likert scale (1=absolutely did not; 5=exceeded the expected learning outcome).

Each year the assessment data will be reviewed to determine if students are meeting the expected learning outcomes. If not, changes to the courses and/or program will be suggested. Even if the learning outcomes are being met, the program will be reviewed annually to assess ways to improve the program. In addition, it is likely the assessment program will evolve from assessments within courses to other formative and summative measures.

Projected Student Performance on Assessments

Since this degree program has no accreditation at the master's level, it is not anticipated that students will take any standardized tests after graduation from, or during, the degree program. Students, though, will be able to demonstrate competencies in data collection and analysis skills, and various core areas of I/O psychology as identified in the *Guidelines for Education and Training at the Master's Level in Industrial-Organizational Psychology* (http://www.siop.org/guidelines.aspx) and specific to the student's specialization emphasis, as addressed in 5D.

Retention and Graduation Rate Goals

Based on the success of our undergraduate program, retention and graduation rates should be at least 70 to 80% (especially with the initially small enrollment numbers), but are expected to increase to over 90% over time.

Projected Graduation Rates at Three and Five Years

As a conservative estimate, 6 students (3 full-time and 3 part-time) are expected to graduate annually by the end of the year 3. Ten students (5 full-time and 5 part-time) are expected to graduate annually by the end of the year 5.

Expected Proportion of Students Achieving Licensure

At this time, there is no required licensing for graduates with a master's in I/O psychology.

Expected Placement Rates vs. Unemployed

Some students will be employed while attending school and will continue their employment after graduation. Given the projected growth of jobs that will require individuals trained in I/O and with strong quantitative and methodological skills, our graduates should find employment. Others will likely attend Ph.D. programs. With the lower enrollment and graduation numbers, initially, we estimate that 80% or higher of our graduates will find employment or be accepted into a graduate program.

Additional Measures of Success

The effectiveness of the MS in I/O Psychology will be measured against several criteria, including:

- The annual number of graduates as a percentage of matriculating students. It is expected that 90% of matriculating students will complete the program within one year of expected graduation.
- Alumni surveys will be used as a qualitative measure of graduates' satisfaction with the program.

- Once internships are established, internship supervisors will be surveyed to determine how well our students were prepared for these placements (e.g., level of knowledge and skills).

Feedback from annual surveys of students and faculty participating in the program will be used to assess effectiveness and improve the program. As these surveys will be administered electronically, the cost of surveying the students and faculty is expected to be minimal. Further, overseeing the evaluation component of the program would be part of the individual's service activities and there will be some support from the administrative assistant, which will not overextend this position.

5.G. Alumni and Employer Survey

Expected Satisfaction Rates for Alumni (include timing and method of surveys)

Alumni surveys will be developed to acquire student input two and five years after graduating. Information sought will include employment history, what courses were most or least beneficial for their performance as employees, and suggestions for improving the program (e.g., what knowledge or skills did they need, but did not gain in the program). Satisfaction rates are expected to be good (70% or higher), but are expected to increase over time (e.g., greater than 80%) as the program develops.

Expected Satisfaction Rates for Employers (include timing & method of surveys)

After our graduates have had some time to establish themselves in the job market, (2-5 years), employer surveys will be conducted to assess the strengths and weaknesses of the program. In particular, the employers will be asked to assess to what degree the graduates possess the various competencies they should have acquired during the completion of this degree. These data will be used to re-evaluate and improve the program. Initially, satisfaction rates are expected to be good (70% or higher) and are expected to increase over time (e.g., greater than 80%) as the program develops.

5.H. Program Accreditation

No specialized accreditation for a master's degree in Industrial/Organizational Psychology exists.

Appendix A: Support Letters from Collaborating Departments

MISSOURI S&T

MISSOURI UNIVERSITY OF SCIENCE AND TECHNOLOGY

formerly University of Missouri-Rolla

June 8, 2012

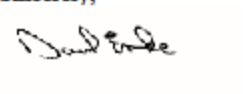
Dr. Nancy Stone, Professor and Chair
Psychological Science Department
109 Humanities-Social Sciences
Missouri University of Science and Technology
Rolla, MO 65409-1270

Dr. Stone:

As Chair of the Department of Engineering Management and Systems Engineering (EMSE) at Missouri University of Science and Technology, I support the proposal by the Psychological Science Department to establish a Masters of Science in Industrial/Organizational Psychology. Our departments have successfully collaborated in the past, most recently in offering a co-listed and at times co-taught course on *Leadership for Engineers*. Each of the EMSE department courses in the proposal currently exists. The listed courses in the areas of human factors, management and leadership leverage current resources and provide a natural opportunity for additional collaboration between our departments.

The EMSE department has been successful in offering graduate education to full-time students as well as working engineers and scientists, illustrating both the quality of the programs and courses that we teach, as well as the demand for the type of educational opportunities that we offer. It is my belief that the proposed Masters in Industrial/Organizational Psychology continues in the spirit of matching quality instruction with graduate education demand. As such, I offer my support and assistance since I believe the proposal is well positioned to leverage existing resources, provide additional opportunities for growth, and align with the campus Strategic Plan.

Sincerely,



David Enke
Professor and Chair
Department of Engineering Management and Systems Engineering
Missouri University of Science and Technology

Engineering Management and Systems Engineering • 227 Engineering Management
600 West 14th Street • Rolla, MO 65409-0370
Phone: 573-341-4749 • Fax: 573-341-6567 • Email: enke@mst.edu • Web: http://emse.mst.edu

MISSOURI S&T

MISSOURI UNIVERSITY OF SCIENCE AND TECHNOLOGY

Formerly University of Missouri-Rolla

May 7, 2012

Dr. Nancy Stone, Chair
Department of Psychology
Missouri University of Science and Technology
500 West 14th Street
Rolla, MO 65409

Dear Dr. Stone:

The Missouri University of Science and Technology Mathematics and Statistics Department supports the Psychology Department's proposal to establish a Master's program in Industrial/Organizational Psychology. We note that courses in Statistics play a prominent role in the proposed program, especially for the Psychometrics Specialization, and view this as a good way to foster collegiality and possible collaborations between our faculty and yours. This proposal will strengthen the ties between our departments, building on the connections we already established with the existing Psychometrics Graduate Certificate program. All of the Statistics courses listed in the proposal already exist and are regularly taught, so providing the courses in Statistics for the Industrial/Organizational Psychology Master's program will not require additional resources.

Industrial/Organizational Psychology is a good strategic direction for the Psychology Department to take based on the Science/Technology/Engineering focus at Missouri S&T. This program will broaden Missouri S&T's academic portfolio and also help increase graduate student enrollments, both of which align well with the campus Strategic Plan.

Sincerely,

Leon M. Hall

Leon M. Hall
Professor and Chair

Department of Mathematics and Statistics • 202 Rolla Building • 400 W. 12th St. • Rolla, MO 65409-0020
Phone: 573-341-4641 • Fax: 573-341-4741 • Email: mathstat@mst.edu • Web: math.mst.edu

MISSOURI S&T

MISSOURI UNIVERSITY OF SCIENCE AND TECHNOLOGY

Formerly University of Missouri Rolla

Professor Keng Siau, Ph.D.
Chair, Business & Information Technology
Missouri University of Science and Technology
101 Fulton Hall, Rolla, MO 65409
Phone: 573-341-4528 Fax: 573-341-4812
Email: siauk@mst.edu

June 19, 2012

To Whom It May Concern:

I am writing this letter in support of the Master of Science in Industrial/Organizational Psychology proposed by the Department of Psychological Science at the Missouri University of Science and Technology.

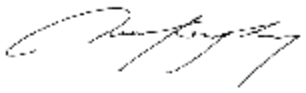
The Department of Psychological Science has the expertise to offer this Master of Science degree. The program is in line with the mission of the Missouri University of Science and Technology, and supplements the existing programs on this campus. The program also does not duplicate programs on other UM campuses. The analysis shows that the student and market demand for the program will be strong. Most of the courses required for the program are already in existence and the program involves courses from other departments in the Missouri University of Science and Technology such as Mathematics and Statistics, Business and Information Technology, and Engineering Management and Systems Engineering. The program is expected to be financially and academically viable after 5 years.

The Master of Science in Industrial/Organizational Psychology is a niche program that will fill a gap in our educational offering in Missouri. The program will be beneficial to students in Missouri and will contribute to the economic development of the State of Missouri and beyond.

The Department of Business and Information Technology has been working closely with the Department of Psychological Science in providing quality education to our students for many years. We look forward to continuing this close collaboration in the Master of Science in Industrial/Organizational Psychology program.

Thank you.

Sincerely,



Keng Siau

Appendix B: Support Letters from Professionals

June 3rd, 2012

Robert Montgomery, Ph. D.
Department of Psychology
University of Missouri
Rolla, Missouri

Dear Dr. Montgomery:

The purpose of this letter is to applaud your plan to establish a Master's degree program in Industrial-Organizational Psychology at your university. It seems to me that it is an excellent idea for at least three reasons.

First, industrial psychology, with its focus on applied problems, empiricism, and quantitative methods, is consistent with the overall thrust of an engineering school. It is no accident that the first program in industrial psychology in the United States, was at Carnegie Tech, an engineering college in Pittsburgh (now Carnegie-Mellon University).

Second, the empirical study of leadership as a core component of an industrial psychology curriculum is enormously important. A course in leadership should be required for any engineering student who wants to have a good career in industry. The lack of such courses is a serious gap in the traditional engineering curriculum, and puts engineers at a disadvantage compared to MBAs.

Third, there is substantial demand for Master's level industrial psychologists in the larger economy. I know this because I hire several each year, and they are scarce. The University of Missouri in St. Louis has been an important source of Ph.D.'s for us, but we also need Master's level Industrial/Organizational Psychologists.

Yours sincerely,

Robert Hogan, Ph. D.
President, Hogan Assessment Systems

May 15, 2012

Cheryl B. Schrader
Chancellor- Missouri University of Science and Technology
206 Parker Hall
300 W. 13th St.
Rolla, MO 65409

Dear Chancellor Schrader:

I am writing this letter in full, enthusiastic support of the Department of Psychological Science's proposal for a Master of Science degree in Industrial/Organizational Psychology. With the solid undergraduate training that I received from the Psychology Department ('74), I found myself well prepared to complete a Master's program in Industrial/Organizational (I/O) Psychology from the University of North Texas ('86). My academic training in Psychology culminated with a Ph. D. in Counseling Psychology from the University of Tennessee-Knoxville ('94). After closing my Knoxville-based private practice of 16 years I have returned to St. Louis, where I am a member of the clinical staff of the St. Louis Behavioral Medicine Institute. I have served on the Advisory Board to the Department of Psychological Sciences for many years. I believe I have a unique perspective from which to offer an informed opinion of the overall, as well as the specific curriculum for the I/O program that the department is proposing.

I think the presence of an Industrial/Organizational program at Missouri S&T is a logical placement within the University of Missouri system. The strength and caliber of the Department of Psychological Sciences, coupled with the technological power of the science and engineering programs at Missouri S&T, provide a singularly powerful partnering of fields of expertise, with promises of only excellent outcomes and opportunities for the graduates of this program. I am particularly impressed with the wealth of human capital in the form of combined faculties that is being proposed for the program. Future students will be fortunate to have the breadth of topics and research interests that are represented by these faculty members.

In my practice in Knoxville, TN I held a multi-year contract to provide on-site psychological services at the Oak Ridge National Laboratory through the benefits program's Employee Assistance Program. The Laboratory is one of the nation's premier sites for conducting computing, technological, mathematic, biological and engineering research. From within that workplace environment I grew increasingly more aware that psychologically trained managers would greatly enhance the interpersonal interactions on the job as well as improve personnel selection, job performance and satisfaction. Having sensitive colleagues and managers who are aware of psychological factors that impact them and their coworkers would only serve to improve the science, research and business that any organization is conducting. A graduate program in Industrial/Organizational Psychology would provide such training to managers of future workplaces, and allow

them to impact the workforce through evidenced-based knowledge of effective change strategies.

I urge you and the Curators to give serious consideration to this proposal. Acceptance of it would surely result in positive outcomes for the students, the Department, the University, and the workplace in which these students will eventually have their impact.

Sincerely,

Patrice M. Ryan, Ph. D.
Licensed Psychologist

HumRRO
Human Resources Research Organization

May 21, 2012

Dr. Nancy Stone
Chair, Master's in I/O Committee
Psychological Science - 136 HSS Building
Rolla, MO 65409-1130

Dear Dr. Stone,

On behalf of the Human Resources Research Organization (HumRRO), I am pleased to write this letter of support for a Master's degree program in Industrial/Organizational Psychology at the Missouri University of Science and Technology. Finding members of the workforce who can increase employee productivity and satisfaction and who are both competent in technical and managerial matters can be difficult. The Master's degree in Industrial/Organizational Psychology would provide professionals who could help organizations meet this challenge. Such a degree would also strengthen our existing strong relationship with Missouri S&T's faculty and students.

HumRRO's mission is to develop and apply state-of-the-art science and technology to improve the performance of individuals and teams within public and private organizations and educational institutions. As a result we need highly trained staff with skills in psychological research, statistics, psychometrics, computer programming and project management. A Master's degree in I/O psychology is an excellent start. One opportunity for Missouri S&T I/O graduate students would be to apply to our summer internship program. Internships give our staff the opportunity not only to integrate new talent into our organization it also gives students the chance to apply their skills to actual research issues in education, military and other organizational settings.

There are increasing demands for people in private and government organizations throughout the country who can function in both technical and management roles of increasing productivity and employee satisfaction, talent development and organizational development. Missouri S&T is well-suited to filling this need with its established reputation in engineering and science and its expanded management and psychology offerings. The fact that I/O programs are rare in the central part of the country, and that this one would fill such a unique niche in the U.S., is more reason for Missouri S&T to establish a presence in this area. I/O graduates will find many opportunities for employment, not only at HumRRO, but with many organizations nationwide.

HumRRO looks forward to the enhanced working relationship that is certain to result from the establishment of the Master's in I/O Psychology degree at Missouri S&T.

Most sincerely,

Laura A. Ford, Ph.D.
Senior Staff Scientist
Human Resources Research Organization
Graduate, Missouri S&T, Psychology (B.S.)

Louisville, KY Office: 10303 Timberwood Circle, Suite 151
Louisville, Kentucky 40223 • 502.339.8331

CALIFORNIA STATE UNIVERSITY
SAN BERNARDINO

College of Social and Behavioral Sciences
Department of Psychology

January 5, 2012

Nancy J. Stone, Ph.D., Professor and Chair
Department of Psychological Science
Missouri University of Science & Technology
109 Humanities & Social Sciences
500 West 14th Street
Rolla, MO 65409-1270

Dear Nancy,

I am delighted to be able to provide a letter of support in the development of the Industrial/Organizational (I/O) Psychology Master's of Science degree at Missouri University of Science and Technology. Clearly, a lot of work has gone into the development of the proposal, which demonstrates considerable thought and research.

First, my overall reaction to the proposal is very positive. There is continuing need for skilled, master's level practitioners in the industrial and organizational area. Further, the program as proposed makes good use of existing resources and permits the cross fertilization of multiple disciplines.

In comparing the core curriculum with the recommendations made by the Society for Industrial and Organizational Psychology (SIOP) for master's level competencies, the core courses are covered in the proposed curriculum. There will be some uneven coverage of the SIOP master's level competencies depending on the program. The greatest coverage of the core SIOP recommendations will be derived by a student who chooses the Leadership and Management in Technical Organizations track. Students in other tracks will have less of those competencies, but these other tracks are somewhat distinct from I/O material (e.g., Psychometrics) and given program resources, will satisfy unique student needs.

Finally, I yet have some concern about the "hidden" units couched within the listed prerequisites (Psych 305, 309, 330, 340, 360, 362). My reservation stems primarily from the standpoint of a student who does not have the undergraduate psychology degree who may be disadvantaged by the need to complete an additional semester. Nevertheless, I support the most highly recommended of these as listed in the program for non psychology majors (e.g., 308, 340, 360).

I wish you the best of luck with your master's program, which shows great promise for technologically savvy students. Feel free to contact me at jkottke@csusb.edu or 909.537.5585.

Sincerely,

Janet L. Kottke

Janet L. Kottke, Ph.D.
Professor and Founder, MS I/O program, CSUSB

909.537.5570 • 909.537.7003 • http://www.psychology.csusb.edu
5500 UNIVERSITY PARKWAY, SAN BERNARDINO, CA 92407-2393

July 6, 2007

Dr. Robert Montgomery
Chair, Master's in I/O Committee
Department of Psychology
109 HSS Building
Rolla, MO 65409-1130

Dear Dr. Montgomery:

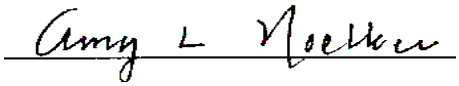
On behalf of DataQuate, LLC, I am pleased to write this letter of support for a Master's degree program in Industrial/Organizational Psychology at the University of Missouri - Rolla. Finding members of the workforce who can increase productivity and employee satisfaction and who are both competent in technical and managerial matters can be difficult. The Master's degree in Industrial/Organizational Psychology would provide professionals who could help organizations meet this challenge. Such a degree would also strengthen our existing strong relationship with UMR's faculty and students.

DataQuate is focused on turning data into information. In both the financial and retail industries, our analyses have supported product management decisions, customer engagement and segmentation activities, sales force deployment, and the like.
An individual with a Master's in I/O Psychology would be well-equipped to address issues such as how employee satisfaction is heavily linked to customer engagement, or the importance of optimally aligning an organization's sales force to efficiently and effectively serve its clients.

There is an increasing need across our nation for people who can function well in both technical and management roles. With the changing demographics of our country, increasing productivity, employee satisfaction, talent development, and organizational development will become key to the future of our workforce. UMR is well suited to fill this need with its established reputation in engineering and science and its expanded management and psychology offerings. The fact that I/O programs are rare in the central part of the country, and that this one would fill such a unique niche in the U.S., is more reason for UMR to establish a presence in this area.

DataQuate, LLC looks forward to the enhanced working relationship that is certain to result from the establishment of the Master's in I/O Psychology degree at UMR.

Sincerely,



Amy L. Noelker
DataQuate, LLC

July 9, 2007

Dr. Robert Montgomery
Chair, Master's in I/O Committee
Department of Psychology
109 HSS Building
Rolla, MO 65409-1130

Dear Dr Montgomery:

On behalf of AT&T HR Research, I am pleased to write this letter of support for a Master's degree program in Industrial/Organizational Psychology at the University of Missouri - Rolla. Finding members of the workforce who can increase productivity and employee satisfaction and who are both competent in technical and managerial matters can be difficult. The Master's degree in Industrial/Organizational Psychology would provide professionals who could help organizations meet this challenge. Such a degree would serve to build a strong relationship with UMR's faculty and students.

Currently, I am responsible for employment testing at AT&T (BellSouth was acquired by AT&T several months ago and we are in the process of changing letterhead). I have a team of I/O Psychologists in my group, both Ph. D. and Master's level. Additionally, I have three interns, all of whom have Master's degrees. I have seen the value of a Master's degree in I/O firsthand.

I have been a practicing I/O Psychologist for over 17 years. In that time, my view of a Master's degree in I/O has gone through an evolution. Early in my career, I was only interested in hiring doctoral candidates as interns or Ph. D.s as employees. In hindsight, I was suffering from a certain arrogance that said without the three magic letters, ability would suffer. I was wrong. Several years ago I hired an employee with an MS in I/O Psychology and kicked myself for what I had been missing. In reality, it is more the person than the program. However, my point is that AT&T is a current benefactor of the Master's degree in I/O Psychology.

Putting on my supervisor's hat, the MS in I/O is particularly attractive. I can get a skilled practitioner for a lower cost than a newly minted Ph. D. who may or may not have much practical experience. It is the practical experience that is embraced and valued in a large organization. In the end, the biggest difference I see is that a person with an MS in I/O cannot be licensed. I really do not need more than one licensed psychologist on staff.

The biggest problem I see as an employer is one of supply. Right now, I believe that the supply is too limited. There is a growing need for skilled people who can

function in both the technical and management roles of increasing productivity and employee satisfaction, talent development and organizational development. I believe that UMR is well-suited to filling this need with its established reputation in engineering and science, its management offerings, and its currently existing psychology program. The fact that I/O programs are rare in the central part of the country, and that this one would fill such a unique niche in the U.S., provides even more reason for UMR to establish a presence in this area.

I look forward to the enhanced working relationship that is certain to result from the establishment of the Master's in I/O Psychology degree at UMR. It has the potential to be a win for both parties.

Sincerely,

SETH ZIMMER

July 6, 2007

Dr. Robert Montgomery
Chair, Master's in I/O Committee
Department of Psychology
109 HSS Building
Rolla, MO 65409-1130

Dear Dr Montgomery:

As President of Watts Radiant in Springfield, Missouri . I'm writing a letter of support for the proposed Master's degree program in Industrial Psychology at UMR . Success today demands that employers select people who are most appropriately suited for each position. The consequences of poor hiring practices are very costly, and your proposed graduates can help solve industry's problems.

As a manufacturer we invest a lot in many of our employees. It is essential that we match up people with jobs that fit their personalities, both for technical positions, and especially in leadership positions. We have been working with Dr. Robert Jones with MSU's psychology department and have found real benefits from using industrial psychology graduate students for a longitudinal study at our facility. Dr. Jones tells me that there is a great demand for his grad students, and that such I/O programs are fairly uncommon in the Midwest.

I believe that UMR has some unique strength in having a world class engineering department and a very strong psychology department. Upgrading this to a master's program would leverage both of these assets in a profitable manner. Missouri manufacturers are under a great deal of stress from imports, and whatever resources that can be brought to bear to increase productivity in a humane way through better selection, better training, and better organizational structure would be a positive development.

A key strategic area I would like to see implemented at UMR's proposed new program would be a focus on the human/machine interface. Whether it is a drive up window at McDonalds or a computer interface, most such interfaces seem to be designed by and for engineers. This is where having engineers and I/0 grad students on the same campus will be very synergistic.

As a UMR psychology graduate I am very appreciative of the excellent education I received at UMR and I strongly endorse this proposed new program as representing a very forward thinking way to strengthen Missouri's competitive position.

Sincerely Yours,

Mike Chiles
President-Watts Radiant

Appendix C: Alumni Survey (2007)

An internet survey was sent in March and April of 2007 to 75 alumni who graduated from Missouri S&T with either a B.S. or B.A. degree in psychology since 1969 and for whom e-mail addresses were available. These alumni were asked how interested they would be in pursuing a **Master of Science Degree in Industrial/Organizational** Psychology if it were offered at Missouri S&T. Responses were received from 30 graduates, which represented a return rate of 40%. The nature of their responses included:

Response Options	Number of Responses
Interested in enrolling	11
No interest because already have a graduate degree	11
No interest because they are retired	4
No interest at all (for other "life-stage" reasons)	4
	30

It is important to also note that since the survey was sent out, 2 additional alums who graduated from Missouri S&T with undergraduate degrees in other disciplines contacted the Chair and indicated an interest in enrolling in this program. Thus, a total of 13 S&T alums indicated an interest in enrolling in the **Master's Degree in Industrial/Organizational Psychology.**

Respondents were also given the opportunity to make comments. A number of positive comments were made by these alums and included the following:

- *Having a MS in Industrial/Organizational Psychology would be a great boon to psychology majors and provide them with knowledge and credentials that will assist their career development.*
- *I am currently a faculty member at another university in Missouri; however, I routinely have students and advisees looking for programs in Industrial/Organizational Psychology and so strongly endorse your plan for UMR to have one.*
- *I think it's a great idea. I got my B.A. in Psychology from UMR and have been working in Human Resources/Personnel for the past 6 ½ years.*
- *I am currently an employee at UMC and considering pursuing a graduate degree. Based on my undergraduate experiences at UMR I would be VERY interested in pursuing such a degree via distance education.*
- *I am working at UMR and have wanted to pursue a Master's degree ever since I got my B.S. several years ago but I can not leave to go to another institution.*
- *After graduating with my B.S. in Psychology I've obtained a job with a law firm. However, I am interested in pursuing a Master's and think the proposed program sounds very interesting.*
- *I have been the chief professional officer at two major non-profits and this experience has shown me what a lack of trained individuals there are in the field of*

organizational psychology. I applaud you on your proactive stance to enhance the Psychology program at UMR in this way.

- *After graduating from UMR, I earned an MS in Industrial Engineering at the University of Iowa. I think the addition of the MS in I/O at UMR is long overdue. In my position, I see that though there are the EE's, ME's, CE's, etc. doing specialized work. When a trouble shooter/problem solver is needed that can look at the big picture and get the firm out of trouble, it's the professional trained in I/O Psych or Industrial Engineering that gets called because of a much broader knowledge base.*
- *While I probably would not enroll in the program because of my current personal and professional commitments, I fully support the program. I believe it can help address some critical and growing gaps for U.S. companies and be a highly respected addition to the UMR cadre of graduate programs.*
- *I think this is great. After I graduated from UMR, I had to transfer to Iowa State in order to get my MS in Industrial Relations.*
- *I think this is a wonderful opportunity for UMR and future students. I would strongly consider such a degree program except that I already have a Master's degree and am currently pursuing my Ph.D.*
- *I would definitely enroll in a distance education program to receive an MS in I/O Psychology. I received my BS in Psychology from UMR in 1997.*
- *I have wanted to pursue my Masters since I got my BS but didn't want to go to another institution*

I think this is a wonderful idea. A great combination of the science and technology leadership that the university is known for, and the fantastic job the Psychology Department is doing already. I think it is a great fit for the UMR or MUS&T student, and will prove to be very popular. I don't know if you know that I already have a Masters degree in I/O in addition to my Ph.D., so I wouldn't be interested in enrolling but do wish I could have done so earlier.

Appendix D: 2007 Survey of Current Psychology Majors

We are excited to announce that the Department of Psychology at the University of Missouri-Rolla is in the process of proposing an M.S. degree in Industrial/Organizational Psychology. We would like to inquire about your interest in pursuing such an M.S. degree from UMR. Courses to satisfy the requirements for this degree could be taken live (on campus), via the internet (distance education), or by a combination of both. We would appreciate your taking a moment to answer the following questions:

1. Tell us how interested you are in a M.S. in I/O that would be offered by UMR:

    A. I would enroll
    B. I would seriously consider enrollment
    C. It is unlikely I would enroll
    D. I definitely would not enroll

2. Indicate whether you are a

    A. Current psychology major
    B. Former Psychology major
    C. Student majoring in something other than psychology
    D. Alum of UMR
    E. UMR staff person
    F. Other

3. Provide any additional comments that you may have concerning this proposed program being offered by the Psychology Department at UMR.

You may e-mail Dr. Robert Montgomery bobm@umr.edu directly with your response to the survey, or mail it directly to Donna Cogell, Administrative Assistant., Psychology Department, University of Missouri-Rolla 65401.

We very much appreciate your time and consideration.

An internet survey of current Junior/Senior psychology majors was completed in February 2007. These student majors were asked how interested they would be in pursuing a Master of Science in Industrial/Organizational Psychology if it were offered at Missouri S&T. They were given four choices.

Response Options	Number of Responses
I would enroll	3
I would seriously consider enrolling	11
It is unlikely I would enroll	4
I definitely would not enroll	0
	18

Eighteen students responded with three (16.7%) indicating they would enroll and 11 (61.1%) indicating they would seriously consider enrolling. Four indicated it is unlikely they would enroll (because they were interested in a different area of psychology), and none indicated they definitely would not enroll. The GPA's of those indicating they would enroll ranged from 3.6 to 4.0.

Students were also given the opportunity to make comments. A number of them did so and they made a variety of positive comments:

- *I am very interested in a graduate degree in Psychology.*
- *I think a M.S. in I/O is a great idea.*
- *I think that the faculty here at Missouri S&T are excellent and that a graduate psychology degree would be beneficial not only to psychology majors but to many in business/management & engineering management type degree programs.*
- *I am very excited about the prospect of this program and look forward to hearing more about its progress.*
- *I think this is a good opportunity for anyone who is interested in Industrial/Organizational Psychology.*
- *I think that an M.S. degree in I/O Psychology would definitely benefit Missouri S&T as a whole.*
- *I can't wait for this program to be approved.*
- *It is exciting to hear that this program is a possibility at Missouri S&T.*
- *I would like to know during what time frame this program would initially be started.*
- *I would definitely enroll in this program as soon as it is offered. Any idea how long it would take to be approved? This honestly is my only hope of pursuing a career in Psychology. I can't wait.*
- *I am completely excited about this possibility! I'd like some more information about it as soon as it's available.*
- *This is such an exciting possibility! I think there would be a lot of interest in this.*

Appendix E: 2010 Student Survey

M.S. in Industrial/Organizational Psychology

Survey of Student Interest in Proposed Program
Fall 2010

The Department of Psychological Science at Missouri University of Science and Technology is in the process of proposing an M.S. degree in Industrial/Organizational Psychology. We would like to inquire about your interest in pursuing this M.S. degree from S&T. Courses to satisfy the requirements for this degree could be taken on campus, via the internet (distance education), or both. We would appreciate you taking a moment to answer the following questions:

Please circle your response choice. (n=41)	Response #	%
1. Tell us how interested you are in an M.S. in I/O that would be offered by S&T		
A. I would enroll	5	12.2%
B. I would seriously consider enrollment	11	26.8%
C. It is unlikely I would enroll	21	51.2%
D. I definitely would not enroll	4	9.8%
2. Indicate whether you are a		
A. Current psychology major	37	90.2%
B. Former Psychology major	1	2.4%
C. Student majoring in something other than psychology	3	7.3%
D. Alum of S&T	0	0%
E. S&T staff person	0	0%
F. Other	0	0%
3. If you are a current student, what is your year?		
A. Freshman	12	29.3&
B. Sophomore	6	14.6%
C. Junior	9	22.0%
D. Senior	8	19.5%
E. Super Senior	6	14.6%
F. Other	0	0%
5. If you are a current student, what do you plan to do after graduation?		
A. Get a job.	10	24.4%
B. Go to graduate school in I/O psychology	2	4.9%
C. Go to graduate school in another area of psychology	20	48.8%
D. Go to professional school (law school, medical school, etc.)	1	2.4%
E. I'm not sure.	4	9.8%
F. Other.	3	7.3%

6. Gender

A. Male	12	29.3%
B. Female	29	70.7%

7. Please submit any additional comments you might have concerning this proposed program. (5 comments)

- *I think it would be a good addition to the psychology curriculum and could be a good fit with S&T's Engineering programs*
- *For #5 I definitely plan on going to grad school, I just don't know into what yet*
- *We have very good professors available already for this!*
- *I feel it is a good idea as it would make S&T more worldly.*
- *I think the dept. would benefit, its just not my area of interest.*

If you have any questions, you may contact Dr. Stone nstone@mst.edu.

THANK YOU! We greatly appreciate your time.

Appendix F: Fort Leonard Wood Survey (2008)

Survey of Personnel at Ft. Leonard Wood

In October 2008 a paper survey was distributed at Ft. Leonard Wood to individuals attending a MANPRINT (the US Army's Human Systems Integration Directorate) course. After a brief written description of the proposed program, the individuals were asked to indicate their interest in the various tracks of the program and the overall program. The results of the 26 respondents are below.

Please indicate your interest in the following tracks:

Human factors track	
Extremely low	3
Low	3
Neutral	1
High	11
Extremely high	8
Leadership track	
Extremely low	3
Low	2
Neutral	9
High	7
Extremely high	5
Psychometrics track	
Extremely low	5
Low	5
Neutral	4
High	9
Extremely high	3
Research track	
Extremely low	3
Low	5
Neutral	8
High	6
Extremely high	4

Please indicate your overall interest in such a graduate program

Extremely low	4
Low	0
Neutral	3
High	12
Extremely high	7

APPENDIX G: Description of Prerequisite Courses

Psych 305 Cognitive Psychology (LEC 3.0) An examination of the basic cognitive processes and their roles in human intelligence and behavior. Topics include attention, memory, knowledge representation, problem solving, decision making, reasoning, language, and consciousness.

Psych 308 Social Psychology (LEC 3.0) Social basis of behavior of individuals in social stimulus situations.

Psych 330 Neuroscience (LEC 3.0) Neurophysiological bases of behavior and cognition are examined. Topics covered include neuroanatomy, neurophysiology, neurotransmission, neuropharmacology, vision, hearing and language, motivated behavior (e.g. eating, drinking, and sexual behavior), learning and memory, cognition and consciousness, and neurologic/psychiatric disorders.

Psych 340 Sensation and Perception (LEC 3.0) An in-depth examination of the human senses, with special emphasis on vision and hearing. Topics include the anatomy and physiology of the eye and ear, neural transduction, the organization and interpretation of sensory signals by the brain, selective attention, and the neural basis of the perception of color, form, space, depth, motion, music, and language.

Psych 360 Personality Theory (LEC 3.0). A comparative examination of theories of personality organization and functioning: includes origins of personality; personality development and change; current developments and research in the area of personality.

Psych 362 Abnormal Psychology (LEC 3.0) Various forms of personality and behavioral disorders are examined. Consideration will be given to neurosis, psychosis, mental deficiency and other deviations, with emphasis on etiology and treatment.

Appendix H: Description of Major Courses

Core Courses

Psych 307 Industrial Psychology (LEC 3.0) Surveys the field of industrial/organizational psychology including topics such as organizational entry (recruitment, selection, training), involvement and participation (motivation, performance assessment, leadership) and organizational influences on work behavior and work attitudes.

Psych 316 Psychology of Leadership (LEC 3.0) Course examines the characteristics of effective versus ineffective leadership. Topics will include theories of leadership, measurement issues, leader-member relationships, charismatic leadership, small group leadership, and strategic leadership in organizations. Practical guidelines for developing leadership skills will be discussed.

Psych 372 Group Dynamics (LEC 3.0) Theories of group process, formation, structure, influence, function, interaction, power, norms, cohesion and development will be investigated. In addition, group performance, decision making processes, leadership, conflict, inter-group relations, and groups and change will be examined.

Psych 374 Organizational Psychology (LEC 3.0) Course seeks to comprehend and predict human behavior in organizational settings through the scientific study of individual processes, group processes, and organizational structure and function.

Methods

Stat 353 Statistical Data Analysis (LEC 3.0) Introduction to methods for analyzing statistical data from experiments and surveys. Analysis of variance, correlation, introduction to regression techniques, contingency tables, non-parametric techniques and an introduction to modern statistical software.

Psych 403 Psychometrics (LEC 3) The application of statistical methods to the study of human behavior in the design and analysis of research and in the measurement of human characteristics and individual differences.

Stat. 444 Design and Analysis of Experiments (LEC 3.0) Experimental designs and their statistical analysis. Includes completely randomized designs, complete and incomplete blocking designs, factorial and fractional factorial experiments, multiple comparisons, and response surface analysis.

Specialization Emphasis Areas

Human Factors

Psych 311 Human Factors (LEC 3.0) An examination of human-machine systems and the characteristics of people that affect system performance. Topics include applied research methods, systems analysis, and the perceptual, cognitive, physical and social strengths and limitations of human beings. The focus is on user-centered design of technology, particularly in manufacturing environments.

Psych 314 Human-Computer Interaction (LEC 3.0) This course introduces students the effective design and use of computers in organizations, which includes the psychological issues in software engineering, technology in the workplace, and organizational design.

Psych 315 Environmental Psychology (LEC 3.0) Study of the psychological effects of different environments and socially relevant problems. Topics covered include: environmental perception, attitudes toward the environment, effects of the environment in work performance, environmental stressors, crowding and the effects of environment on interpersonal relations.

EMgt 380 Work Design (LEC 3.0) Addresses the design of workstations and tasks. Topics include micro-motion, operational analysis, manual material handling, workstations organization, macro-ergonomics, anthropometrics, biomechanics, cumulative trauma disorders, hand tool design, controls/displays design, work sampling, stopwatch time studies, predetermined time standard systems, and time allowances.

EMgt 386 Safety Engineering (LEC 3.0) This course is an introduction to the principles of safety engineering applied to industrial situations. Job safety analysis, reduction of accident rates, protective equipment, safety rules and regulations, environmental hazards, health hazards, and ergonomic hazards are covered.

EMgt 456 Advanced Personnel Management (LEC 3.0) Current practices of procurement and maintenance of technical personnel in research, development, and design organizations. Adaptation of such personnel to the technological enterprise, current practices in personnel administration, labor management relationships.

ERP 346 Enterprise Resource Planning Systems (LEC 3.0) This course provides a technical overview of Enterprise Resource Planning Systems and their impact on organizations. SAP is introduced to illustrate the concepts, fundamentals, framework, general information technology context, the technological infrastructure, and integration of business enterprise-wide applications.

ERP 347 Supply Chain Management Systems LEC 3.0) The course studies the need for supply chain integration and the challenges of managing complex interfaces. This course focuses on the systems approach to the planning, analysis, design, development, and evaluation of supply chain. The course discusses activities that lead to integration of information and material flows across multiple organizations.

ERP 348 Strategic Enterprise Management Systems (LEC 3.0) This course will study the use of information technology for the formulation and implementation of strategy in the organization. SAP's Strategic Enterprise Management (SEM) will be used to study the development of business plans, definition of key performance indicators, and evaluation of businesses.

IST 385 Human-Computer Interaction(LEC 3.0) Introduction to the field of Human-Computer Interaction (HCI). Students examine issues and challenges related to the interaction between people and technology. The class explores the social and cognitive characteristics of people who use information systems. Students learn techniques for understanding user needs, interface prototyping, and interface evaluation.

IST 386 Human-Computer Interactions Prototyping (LEC 1.5 and LAB 1.5) This course covers designs, methods and tools for creating low and high fidelity prototypes of information technology systems, which is part of the iterative design cycle commonly used for the creation of usable information technologies.

IST 387 Human-Computer Interaction Evaluation (LEC 1.5 and LAB 1.5) This course covers research and analysis methods and tools for evaluation of the impact of information technology systems on humans and organizations. The focus will be on practical evaluation with the goal of providing recommendations for improving system functionality and usability.

IST 480 Social Informatics (LEC 3.0) The course examines web and new-media technologies from a socio-psychological perspective. The class will focus on recent innovations, integrating these approaches into class interaction and student projects.

IST 487 Research Methods in Human Computer Interaction (LEC 1.5 and LAB 1.5) This course covers advanced skills necessary for conducting research within the area of human-computer interaction. The course will cover techniques and tools for carrying out literature reviews, forming research goals, designing appropriate research methodology, conducting data analyses, and preparing manuscripts and presentations of findings.

Leadership in Technical Organizations

Psych 370 Advanced Social Psychology (LEC 3.0) An advanced study of the behavior of individuals in interaction within groups. Consideration will also be given to the experimental literature dealing with the formal properties of groups, conformity and deviation, inter-group relations, and attitude formation and attitude change.

Psych 378 Social Influence (LEC 3.0) Principles and procedures that affect the process of social influence, with consideration given to attitudinal, compliance inducing, and perceptual influences.

Psych 380 Cross Cultural Psychology (LEC 3.0) Provides a cross-cultural perspective as an essential element of current curricula in psychology. Students will receive an understanding of how self-concept, cognitive abilities and social relations are affected by cultural factors.

Psych 418 Leadership for Engineers** (LEC 3.0) Provides engineers with a background in leadership concepts and principles; enables students to develop practical skills in leading and managing through a personal inventory analysis. Topics include leadership styles, managing conflicts, conflict resolution, change management, emotional intelligence, team dynamics and business ethics.

EMgt 313 Managerial Decision Making (LEC 3.0) Individual and group decision making processes and principles for engineers and technical managers with an emphasis on the limitations of human rationality and the roles of social influence and organizational contexts; principles and skills of negotiation.

EMgt 327 Legal Environment (LEC 3.0) Study of the effect of the legal environment on the decisions which the engineering manager must make. The course investigates the social forces that produced this environment and the responsibilities incumbent upon the engineer.

EMgt 411 Human Systems Integration (LEC 3.0) This course considers Human System Integration (HSI) in a variety of applications including systems acquisition and training, HSI tools, techniques, and procedures. (Prerequisite: EMGT/Psych 311 - Human Factors).

EMgt 420 Technological Innovation Management (LEC 3.0) Technological innovation is new technology creating new products and services. This course studies the issues of managing technological innovation under four topics: 1) Innovation; 2) New Ventures; 3) Corporate Research & 4) R&D Infrastructure.

EMgt 456 Advanced Personnel Management (LEC 3.0) Current practices of procurement and maintenance of technical personnel in research, development, and design organizations. Adaptation of such personnel to the technological enterprise, current practices in personnel administration, labor management relationships.

IST 351 Leadership in Technology Based Organizations (LEC 3.0) The course focuses on the knowledge and skills necessary for the development and implementation of effective strategies for the management of technology-based organizations. This involves: developing a general management perspective on technology and innovation, examining the problems of new product development, identifying distinctive technological competencies, licensing and marketing technologies, assessing the organizational and industrial context of technology.

IST 368 Law & Ethics in E-Commerce (LEC 3.0) Provides the ethical framework to analyze the ethical, legal, and social issues that arise for citizens and computer

professionals regarding the computerization of society. Topics include: free speech, privacy, intellectual property, product liability, and professional responsibility.

**Course co-taught by Psychological Science and Engineering Management and Systems Engineering Departments

Psychometrics

Psych 364 Tests and Measurements (LEC 3.0) Theoretical and statistical basis of psychological testing and measurement; characteristics of well-known statistical tests of intelligence, aptitude, interest, academic proficiency, and personality; use of tests and test batteries for prediction of criteria.

Stat 343 Probability and Statistics (LEC 3.0) Intorduction to the theory of probability and its applications, sample spaces, random variables, binomial, Poisson, normal distributions, derived distributions, and moment generating functions.

Stat 344 Mathematical Statistics (LEC 3.0) A continuation of Stat 343 with introduction to the theories of point estimation, hypothesis testing, and interval estimation. Includes sufficiency, completeness, likelihood and how they apply to the exponential family.

Stat 346 Regression Analysis (LEC 3.0) Simple linear regression, multiple regression, regression diagnostics, multicollinearity, measures of influence and leverage, model selection techniques, polynomial models, regression with autocorrelated errors, introduction to non-linear regression.

Stat 444 Research Design (LEC 3.0) Experimental designs and their statistical analysis that include completely randomized designs, complete and incomplete block designs, factorial and fractional factorial experiments, multiple comparisons, response surface analysis.

Stat 445 Multivariate Statistics (LEC 3.0) Analysis of data consisting of simultaneous measurement on many variables that include multivariate normal distribution, multivariate analysis of variance, canonical correlation, principal components, classification and clustering techniques.

Stat 453 Linear Statistical Models I (LEC 3.0) Includes a development of the theory of the distribution of quadratic forms, and the estimation of parameters and testing hypotheses in linear statistical models.

Stat 454 Linear Statistical Models II (LEC 3.0) Includes the theory of polynomial models, regression models, experimental design models, incomplete block models, nonlinear models, with emphasis on optimum properties of point and interval estimation and the power of tests.

Research

No additional courses.

APPENDIX I: Faculty to teach the Industrial/Organizational Psychology Courses
(outside of Psychological Science faculty)

Business and Information Technology

Yu-Hsien Chiu, *Assistant Teaching Professor*, Ph.D. (University of Wisconsin-Milwaukee) – Enterprise resource planning, accounting information systems.

Craig Claybaugh, *Assistant Professor*, Ph.D. (University of Wisconsin-Milwaukee) – Enterprise software usage, information technology vendor-client relationships, online trust, social networking, Internet abuse.

Barry Flachsbart, *Professor*, Ph.D., (Stanford University) – Expert Systems, Artificial Intelligence, Neural Networks, Fuzzy Logic, large databases, manufacturing information systems, information system project management.

Richard Hall, *Professor,* Ph.D., Texas Christian University – Cognitive processes in academic learning; spatial text displays (in particular knowledge maps); and the role of advanced technologies; in particular the world wide web, in education.

Michael Hilgers, *Professor, Associate Chair,* Ph.D., (Brown University) – Learning information systems, virtual reality, participative simulations.

Bih-Ru Lea, *Assistant Professor*, Ph.D., (Clemson University) – Supply chain management, integrated business systems, simulation, managerial accounting, and large business databases.

Nah, Fiona Fui-Hoon, *Professor*, Ph.D., (University of British Columbia) – Strategic management and leadership in technology-based organizations, electronic commerce, mobile and ubiquitous commerce, and human-computer interaction.

Hong Sheng, *Assistant Professor,* Ph.D., (University of Nebraska-Lincoln) – Human-Computer Interaction, information systems management, E-Commerce, mobile commerce and ubiquitous commerce, strategic implications of mobile technology, trust and privacy issues in information systems, RFID in Health Care.

Vincent Yu, *Assistant Professor,* Ph.D., (University of Louisville) – Agent Based Systems, Supply Chain Management, Demand Forecasting, Simulation, and Textile Processes.

Mathematics and Statistics

Akim Adekpedjou, *Assistant Professor*, Ph.D., (University of South Carolina) – Statistics;,Recurrent event data analysis, stochastic processes, survival analysis, actuarial science.

Robert L Paige, *Associate Professor,* Ph.D., (Colorado State University) – Saddlepoint, approximations, non-parametric methods, biostatistics.

V.A. Samaranayake, *Professor,* Ph.D., (Kansas State University) – Reliability, time series analysis, statistical applications in biology, economics, and engineering.

Xuerong Wen,, *Associate Professor,* Ph.D., (University of Minnesota) – Dimension reductions, nonparametric regression, statistical genetics, biostatistics, regression graphics.

Engineering Management and Systems Engineering

John Bade, *Associate Adjunct Professor,* Ph.D., (University of Missouri-Rolla) – Leadership, supplier management, program management.

Randy Canis, *Adjunct Professor,* J.D., (University of Missouri-Columbia) – Patent attorney.

William Daughton, *Professor Emeritus,* Ph.D., (University of Missouri-Columbia) – Process management; project management; strategic planning; organizational development.

Benjamin Dow, *Lecturer,* Ph.D., (Purdue University) - Project management; engineering economics; finance.

Suzanna Long, *Assistant Professor,* Ph.D. (University of Missouri-Rolla) – Strategic Management, change management, business logistics, and marketing.

Susan Murray, *Professor,* Ph.D. (Texas A&M University) - Industrial engineering; project management; productivity improvement; human factors; safety.

Michael Schmidt, *Lecturer,* M.S., (University of Missouri-Rolla).

David Spurlock, *Lecturer,* Ph.D., (University of Illinois) – Industrial and Organizational Psychology; decision making processes; managing people in organizations; organizational change and development; program evaluation; influence of technological change on workplace behavior.

Appendix J: Program Outcomes

Increasingly, people factors are recognized as a major determinant of organizational performance and as a key competitive differential. Graduates of the Missouri S&T's **Industrial /Organizational Psychology Master of Science** degree program will be able to provide important advice with regard to a variety of the people factors critical for creating and maintaining a maximally effective organization.

Using the competency-based training model in SIOP's *Guidelines* for graduate training in I/O psychology (http://www.siop.org/guidelines.aspx),

1. All students should be aware of the **Core Psychological Domains** given the prerequisites for the program (undergraduate education may contribute) and the required Core Courses. In particular, students should have an awareness of the different fields of psychology such as
   a. Biological Bases of Behavior (e.g., physiological psychology, sensation and perception)
   b. Learned Bases of Behavior (e.g., learning and cognition)
   c. Social Bases of Behavior (e.g., social psychology, group dynamics, systems theory)
   d. Individual differences (e.g., personality theory, life-span development)
2. All students should be knowledgeable of the **Data Collection and Analysis Skills** given the prerequisites for the program and the required Methods Courses. In particular,
   a. students should have an understanding of the different research methods. The students will have an understanding
      1) of the scientific method, how to develop hypotheses, what constructs are;
      2) of the difference between experimental, quasi-experimental, and non-experimental designs;
      3) how to measure reliability and validity;
      4) how to administer different tests (e.g., surveys, observation, interviews);
      5) of the different research strategies (e.g., lab experiment, field study, case study, simulation) and their strengths and weaknesses, they will develop an appreciation for alternative strategies; and
      6) of the ethical standards for research involving human participants.
   b. students should have an understanding of the different statistical methods/data analysis. The students should know
      1) the difference between descriptive and inferential statistical methods;
      2) the difference between parametric and nonparametric statistical methods;
      3) how to estimate central tendency;
      4) how to measure variability;
      5) what sampling distributions are as well as inferences about mean differences;
      6) how to analyze and interpret univariate analysis of variance;
      7) how to analyze and interpret linear regression analysis and correlation, and multiple regression;

8) the proper uses, inferences, and interpretations of these methods and analyses; and
9) how to use a major statistical package (e.g., SPSS, SAS).

c. our students will gain (at a minimum) an awareness of alternative statistical analyses such as multivariate analysis of variance, path analysis, factor analysis, and meta-analysis.
d. students in the Psychometrics emphasis will have a greater knowledge of research and statistical methods as well as the statistical and data analyses.

3. All students will have knowledge of various **Core Industrial / Organizational Domains** and, depending on the specialization emphasis, students will have varying levels of other Core Domains.
   a. Ethical, Legal, and Professional Contexts
      1) All students should be knowledgeable of the Ethical, Legal, and Professional Contexts, which includes knowledge of relevant ethical guidelines;
      2) All students should act in accord with these relevant ethical guidelines.
   b. Measurement of Individual Differences
      1) All students should have an understanding of classical measurement theory (i.e., the measurement of reliability and validity);
      2) All students should be exposed to modern measurement theories that apply to the identification and application of individual differences (e.g., item response theory);
      3) All students must be able to monitor their performance when applying measurement principles to ensure the highest standards in order to meet the legal, civil rights, and professional expectations of performance.
      4) Students in the Psychometrics emphasis will have a greater understanding of classical measurement theory.
   c. Criterion Theory and Development
      1) All students should have an understanding of single and multiple criteria, the dynamics among criteria, characteristics of good criteria, and how to develop and appropriately use criteria.
      2) All students will be able to develop and measure criteria.
      3) Students in the Psychometrics emphasis will have a greater understanding of the methods used in criterion development.
   d. Job and Task Analysis
      1) All students should be able to define what job and task analyses are and to explain the differences.
      2) All students should be knowledgeable of the different ways of conducting job and task analyses.
      3) All students should know the steps for, and be able to implement, a job or task analysis for a particular need.
      4) All students should be able to apply the information gained from job and task analyses appropriately.
      5) Students in the Leadership in Technical Organizations emphasis will have greater knowledge about job and task analyses.
   e. Employee Selection, Placement, and Classification

1) All students should be able to identify the knowledge, skills, abilities, and other characteristics (KSAOs) required for a job (as discussed in 3.d. above).
2) All students should be aware of the selection procedures available for measuring the KSAOs.
3) Students in the Leadership in Technical Organizations emphasis will be able to identify the appropriate selection procedure and the appropriate evaluation strategy, will be able to develop the appropriate content valid selection procedures, will be able to identify when someone with greater knowledge and expertise is needed to develop and evaluate the selection program, and will have the knowledge to know to follow the direction of a Ph.D. psychologist when conducting validation studies.

f. Performance Appraisal and Feedback
1) All students should understand the different rating scales and the advantages of different rating sources (e.g., supervisor, peer).
2) All students should understand the factors that can influence performance assessment (e.g., perceptions).
3) All students should understand how to communicate the appraisal information back to the worker and how to advise the worker on ways to improve performance.
4) All students should be able to develop a performance appraisal system, with feedback, that addresses the organization's needs and workers' motivation and performance improvement.

g. Training: Theory, Program Design, and Evaluation
1) All students should understand how to conduct a needs analysis.
2) All students should understand the basic principles of learning and different training strategies (e.g., simulation, computer-assisted, on-the-job).
3) All students should understand ways to address the transfer of training.
4) All students should understand the factors of the training that might impact training effectiveness and possible ways to address these.
5) All students should understand how to appropriately evaluate the training program, which includes knowledge of evaluation designs (e.g., pre- and post-tests).

h. Work Motivation
1) All students should be knowledgeable of specific theories of motivation (e.g., needs theories) and understanding that a vast literature on motivation theories exists outside of and within the work (I/O) domain.
2) All students should understand general (e.g., goal-setting, participative leadership/management) and specific applications (e.g., management by objective) of motivation theory.

i. Attitude Theory
1) All students should "be aware of the extensive literature on the determinants, consequences, and measures of job satisfaction and related constructs."

j. Small Group Theory and Process

1) All students should understand interpersonal behavior in small groups.
2) In particular, students should understand "leadership and power, interpersonal influence, group effectiveness, conformity, conflict, role behavior, and group decision making."
3) Students in the Leadership in Technical Organizations emphasis will have a greater understanding of "leadership and power, interpersonal influence, group effectiveness, conformity, conflict, role behavior, and group decision making."

k. Organization Theory
   1) All students should understand "classical and contemporary theories of organizations, organizational structure, organizational design, technology, and the process of organizational policy formation and implementation."

l. Organization Development
   1) All students should understand the different types of change strategies (individual, small group, organizational).

Students in the various specialization emphasis areas and thesis option will acquire greater exposure and training in various competences, as identified above. In addition,

a. Students in the Human Factors Emphasis will gain knowledge in the Human Performance/Human Factors additional domain (desirable, but not essential for I/O Psychology training at the master's level).
   1) These students will have knowledge in applied areas such as work station design, workload, and human-computer interactions.
   2) These students will understand ways to design their environment (e.g., computers, work space) for more efficient functioning, less error, and (possibly) greater safety.
b. Students who select the thesis option will have a greater understanding of research methods and statistical analyses in an I/O topic of their choosing.

Specific Skills of Graduates

All students should be able to

1. conduct a job and task analysis;
2. select and develop criterion measures;
3. develop a selection program, which includes an evaluation phase;
4. develop a training program, which includes an evaluation phase;
5. develop a performance appraisal program, which includes an evaluation phase;
6. identify appropriate motivational strategies for a particular situation;
7. identify the measures and determinants of work attitudes for current worker attitudes;
8. identify the leadership, power, and decision making styles and strategies that are impacting group effectiveness;
9. identify the current organizational structure and how it can affect organizational effectiveness;
10. identify strategies of change for different levels of the organization (individual, group, organization).

Students in the Human Factors non-thesis emphasis

1. will be able to identify potential problems within a work environment,
2. will be able to make suggestions for improvement to this work environment.

Students in the Leadership in Technical Organizations non-thesis emphasis

1. will be able to identify managerial and leadership decision making strategies in technological organizations
2. will be able to identify ways to motivate workers in technological and scientific work environments.

Students in the Psychometrics non-thesis emphasis

1. will be able to test measures appropriately for sound psychometric properties (e.g., reliability, validity)
2. will be able to conduct a variety of statistical methods (e.g., regression analysis, multivariate statistics)
3. will be able to use various statistical packages proficiently.

Students who select the thesis option

1. will be able to conduct quality research independently
2. will be able to evaluate other research critically
3. will be able to succeed in a psychology graduate program.

In summary, I/O Psychologists, in general, help organizations define strategies, set policies, and implement practices involving the performance and well being of people at work. These psychologists apply the rigor and methods of psychological science to issues of critical relevance to business and other work organizations. Graduates of the Missouri S&T **Industrial / Organizational Psychology Master of Science** degree program will have the skills needed to help management make effective decisions regarding talent within organizations, including the assessment of people for selection and placement into jobs; development of effective training programs; strategies for organizational development; measurement of performance; and ways to promote quality of work-life. A human factors option in the program will enable graduates to acquire skills to be able to deal with a variety of human performance issues in many settings, including technological environments (e.g., workload, fatigue, situational awareness, usability of equipment, attention, human reliability, stress, visualization of data, individual differences, accessibility, safety, human error, and decision making). Moreover, an emphasis in psychometrics will provide graduates with the background to measure knowledge, skills, abilities, and personality characteristics of people for a variety of employment-related purposes (e.g., selection for promotion, training and development, and assessment of employee morale, job satisfaction, and attitudes towards management or customers).