Justification for Developing a Masters of Science in Technology at Indiana University-Purdue University Fort Wayne

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ABSTRACT

The mission of Indiana University-Purdue University Fort Wayne (IPFW) is to offer a broad range of high-quality undergraduate, graduate, and continuing education programs that meet regional needs; to support excellence in teaching and learning; to advance and share knowledge through research and creative endeavor; and to work with the community to develop intellectual, cultural, economic, and human resources. The IPFW strategic plan incorporates the University's mission statement to provide graduate study to meet the growing needs of profit and nonprofit organizations in the northeast Indiana region. IPFW students are generally residents of the northeast Indiana region who choose to continue their studies without moving, uprooting families, or disrupting careers. IPFW is committed to contributing to the economic well-being of the region and to preparing students to be active and responsible members of a global society and workplace. This commitment increasingly means post-baccalaureate study that includes an understanding of complex areas of modern technology. The proposed Master of Science in Technology meets the needs of northeast Indiana to provide the knowledge and skills to function effectively in a technical environment and accept increasing responsibility in technical leadership positions [1, 2]. It will also permit specialization in an area of modern technology applicable to each student's working environment or area of interest, improve understanding of working in a global environment, offer students the opportunity to obtain an accessible, affordable, high quality graduate degree from a state-assisted institution of higher learning, and prepare students for doctoral degree opportunities in Technology or a closely related field. Faculty participation in the program will also provide increased opportunity at IPFW to advance knowledge through research and creative endeavor.

PLANNING PROCESS

The need for the proposed M.S. in Technology program at IPFW was jointly perceived by the administration and faculty for a degree that focused on technology. The degree is needed to prepare students for the advanced technological requirements of the modern workplace without some of the advanced theoretical components contained in advanced degrees in engineering and computer science. Initial efforts toward development of a program at IPFW occurred several years ago, and continuous discussions with faculty and administrators in the College of Technology at Purdue, West Lafayette have occurred since then. An IPFW faculty member was appointed to the Purdue College of Technology graduate education committee and has attended meetings related to the Purdue M.S. in Technology since January 2003. The proposed curriculum was developed by faculty members from the Engineering Technology departments at IPFW with input from the departments of engineering and computer science, and from the division of organizational leadership and supervision.

Technology is an all-encompassing area, and topics in this program may appear to overlap with engineering science or computer science subjects [3]. However, this program focuses on the current and future use of technology and not on the theoretical and scientific basis for the technology. This program is distinct from, yet will complement, other technical graduate programs at IPFW, much as is the case with the M.S. Technology program at Purdue, West Lafayette. The Technical Electives that are an integral part of this program will enable students to branch out into other technical programs at IPFW and will provide learning opportunities that cross disciplinary boundaries.

STUDENT DEMAND

Enrollment interest is summarized (Table 1) from surveys of current IPFW juniors/seniors in engineering technology degree programs and of graduates of IPFW B.S. programs in engineering technology.

One hundred and eight (108) current junior and senior Engineering Technology students returned the optional survey instrument, which had a return rate of approximately 70%. Table 1 below provides an overview of survey results. Instructors of Junior/Senior classes were provided with the surveys and asked to distribute them to students who were in attendance. There were additional students in the classes surveyed, but if students were in more than one class, they only filled the survey out once. Students not in attendance on the day of the survey were not included, and students could choose to not fill out the survey.

Question	
Consider earning M.S. Technology at IPFW	**Positive/Total Returned - %**
Construction Technology Majors	28/36 – 78%
Electrical ET Majors	20/21 – 95%
Mechanical or Industrial ET Majors	48/51 – 94%
	Total = 108
Principal Technology Area of Interest	**# interested in each area** (not all responded)
Facilities/Construction Management	34
Info Tech/Adv Computer Applications	17
Industrial Technology/Manufacturing	47
When would you consider enrolling?	**# choosing this response** (some responded in more than one category)
Immediately	32
After working for a year or two	48
In 5 or more years	3
When determine that degree will help in advancing in my field	24
When sufficient funding is available	9

Table 1. Student Demand

ALUMNNI SURVEY

The alumni survey was mailed to one thousand seven hundred and fifty (1750) graduates with a B.S. in Engineering Technology from IPFW who had addresses listed in the database. Fifty-three (53) of these were returned because of incorrect addresses. Two hundred and ninety nine (299) surveys (17.6% of correct addresses) were completed and returned. Table 2 provides an overview of survey results. Note that totals do not add up to 299 in each category due to lack of response or multiple responses from alumni.

Question	# of respondents
Degree	
Construction Technology	80
Electrical Engineering Technology	93
Mechanical or Industrial Engineering Technology	116
	289
Principal Technology Area of Interest	
Facilities/Construction Management	80
Info Tech/Adv Computer Applications	69
Industrial Technology/Manufacturing	107
	256
When would you consider enrolling?	
Immediately	48
In a year or two	52
When determine that degree will help in advancing in my field	84
When I have the available time	46
When Sufficient funding is available	19
	249
If not interested in M.S. Technology at IPFW, why?	
Enrolled in or have a Master's or higher degree	40
These technology areas are not applicable to my employment	15
I have no current interest in a master's degree	43
Other (these were mostly out of N.E. IN or close to retirement)	48
	146

Table 2. Alumni Survey Data

Enrollment projections are based on the survey results summarized above. The thirty-two (32) current students and forty-seven (47) alumni who responded that they were interested in enrolling immediately provided the most current data on possible enrollment. Enrollment projections for the program are shown in Table 1: Program Enrollments and Completions, of Part E: Tabular Information. Projections use academic year 2006/2007 as a baseline and are based on projected industry demand, alumni preferences, and current student interest.

DEMAND AND EMPLOYMENT

Northeast Indiana shares the statewide need for persons with knowledge of the technical aspects of modern industry. There are many persons with non-technical baccalaureate degrees who work within technical departments or work closely with technical specialists. These persons may need advanced knowledge in technical areas, but do not have the academic preparation for acceptance into an analytical engineering or computer science graduate program. An indication of program need is the interest generated when the program is discussed with current students and alumni of IPFW engineering technology programs. The survey discussed above addresses the demand from the many graduates of IPFW engineering technology programs employed in the northeast Indiana region who may wish to matriculate into an M.S. program to increase their knowledge and skills in a specific technical area. Support for the program was received during annual Industrial Advisory Committee (IAC) meetings for the each of the three engineering technology departments at IPFW. These three departments are:

Electrical and Computer Engineering Technology (ECET), Mechanical and Industrial Engineering Technology (MIET), and Civil and Architectural Engineering Technology (CAET).

Nationally, the U.S Bureau of Labor Statistics maintains many tables that provide Economic and Employment projections and total job openings at the U.S. Bureau of Labor Statistics[4]. Some relevant data on advanced degrees is shown in Table 3 below. The data projects an increase in number of employees with advanced degrees in the workforce. This illustrates the increasing trend for employers to prefer advanced education and for employees to seek to continue their education.

Most significant source of education or training	Number (thousands of jobs)	Change % distribution
Master's degree	333	1.5
Bachelor's or higher degree, plus work experience	1,422	6.4

Table 3. Employment and total job openings by education or training category, 2000-2010

Some of the long term job projections for Indiana are shown in Table 4. Occupations shown are those that contain the majority of graduates with degrees in engineering technology or technology. Persons in these positions may be expected to gain the greatest benefit from the proposed technical degree. The figures shown were compiled by the Indiana Department of Workforce Development office[5]. An example of the relevance of several of these positions is that an examination of job titles of B.S. graduates at IPFW showed that approximately 70% of graduates had engineering job titles. A smaller number of graduates had technician and technologist job titles. These figures for northeast Indiana do not indicate the percentage of these jobs that require or desire an M.S. degree, however, it is expected that students completing the M.S. in Technology will more effectively compete for these positions as openings occur.

Job Title	2000 Employment	2010 Employment	Annual Avg. Total Openings
Computer Engineers	1030	1450	60
Computer Support Specialists	640	1050	40
Computer Programmers	650	630	10
Comp. & Network Analysts, Specialists, and Administrators	1490	2050	80
Civil Engineers	390	410	10
Elect & Electronic Engineers	870	800	20
Industrial Engineers	840	780	10
Mechanical Engineers	1150	1100	30
Comp. & Info.System Managers	570	720	30
Industrial Production Managers	1080	1060	20
Construction Managers	480	540	20
Engineering Managers	620	570	10

Table 4. Long Term Job Projects for Indiana

CONCLUSION

The survey results concluded the immediate need to for developing a Masters of Science in Technology at Indiana University-Purdue University Fort Wayne. The Masters of Science in Technology was developed in 2006 and has three area's of specialization: Facilities/Construction Management, Info Tech/Adv Computer Applications, and Industrial Technology/Manufacturing. Future paper will discuss the curriculum and the curriculum development process.

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JIHAD M. ALBAYYARI

Dr. Albayyari is a Professor and Chair of Mechanical and Industrial Engineering at Indiana University Purdue University Fort Wayne. He received his BS, MS, and PhD. from the University of Cincinnati. His academic experience includes development of curricula and programs. His research interest is in the area of micro-gravity in which he received several NASA grants. Dr. Albayyari also worked with several industrial companies.

HAL BROBERG

Hal Broberg received his PE license in Indiana and his PhD in Engineering (EE). His research area is servo systems and he consulted for ITT Industries on weather satellite servos for 10 years. He is currently Associate Dean of the college of Engineering, Technology, and Computer Science and Chair of the ECET Department. Hal is a senior member of IEEE and winner, with the college, of the 2006 ASEE Berger Award for excellence in engineering technology education.

BIMAL P NEPAL

Bimal is an Assistant Professor in Department of Mechanical and Industrial Engineering Technology at IPFW. He completed his Ph.D. in Industrial Engineering from Wayne State University (USA) in 2005. His areas of research interests include product development, systems engineering and applied operations research. His work has been published in the journals like International Journal of Production Economics, and Journal of Engineering Design. Bimal has worked on a number of R&D projects for Ford Motor Company and Visteon Corporation. He also holds a Masters degree in IE and B.S. in Mechanical Engineering. He is a member of IIE, ASQ, ASEE, and INFORMS.