UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

EP.10.02

Office of the Provost and Vice Chancellor
for Academic Affairs

Swanlund Administration Building
601 East John Street
Champaign, IL 61820

August 11, 2009

Abbas Aminmansour, Chair
Senate Committee on Educational Policy
Office of the Senate
228 English Building, MC-461

Dear Professor Aminmansour:

Enclosed is a copy of a proposal from the Graduate College and College of Agricultural, Consumer and Environmental Sciences to establish a MS in Technical Systems Management and an Optional Graduate Concentration in the Professional Science Master's Program.

This proposal has been approved by the Courses and Curricula Committee of the College of Agricultural, Consumer and Environmental Sciences and the Graduate College Executive Committee. It now requires Senate review.

Sincerely,

Kristi A. Kuntz
Assistant Provost

KAK/dkk

Enclosures

c: D. Dutta
A. Hansen
J. Harper
F. Kolb
C. Livingstone
W. Simmons
K. Ting
Y. Zhang

telephone (217) 333-6677 • *fax* (217) 244-5639
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UNIVERSITY OF ILLINOIS
AT URBANA - CHAMPAIGN

Kelly A. Tappenden, Ph.D., R.D.
Associate Dean

Graduate College
202 Coble Hall, MC-322
801 South Wright Street
Champaign, IL 61820-6210
www.grad.uiuc.edu

April 16, 2009

Kristi Kuntz
Assistant Provost
Office of the Provost
207 Swanlund, MC-304

Dear Kristi:

Enclosed is the 'Proposal for a Master of Science Degree with a Major in Technical Systems Management and an Optional Graduate Concentration in the Professional Science Master's Program'. Upon revision, the Graduate College Executive Committee voted unanimously to approve this proposal.

I send it to you now for further review.

Yours truly,

Kelly Tappenden, Ph.D., R.D.
Associate Dean, Graduate College
Professor of Nutrition and
Gastrointestinal Physiology

Enclosure

c: A. Hansen
J. Harper
F. Kolb
K.C. Ting
Y. Zhang
D. Dutta

PROPOSAL TO THE SENATE COMMITTEE ON EDUCATIONAL POLICY

TITLE OF THE PROPOSAL

Proposal for a Master of Science Degree with a Major in Technical Systems Management and an Optional Graduate Concentration in the Professional Science Master's Program

SPONSOR:

Joe G. Harper, Ph.D.
Professor and Technical Systems Management Program Coordinator
Department of Agricultural and Biological Engineering
College of Agricultural, Consumer, and Environmental Sciences
1304 W. Pennsylvania Ave.
Urbana, IL 61801
Phone: 217.333.2738
jgharper@uiuc.edu

BRIEF DESCRIPTION:

The Master of Science in Technical Systems Management (TSM) will serve students seeking a post-graduate degree as an enhanced preparation for a career in agricultural and biological technical systems management. It will provide exposure to faculty and industry research in agricultural, construction and environmental systems, equipment and food industries, or environmental protection and safety. Degree requirements include 33 semester hours (of which 25 hours are formal coursework and 8 hours are Thesis Research) and the preparation and oral defense of a thesis.

The Master of Science in Technical Systems Management will also be offered as a non-thesis option. Candidates who are permitted to pursue a non-thesis degree must complete a minimum of 36 semester hours.

Additionally, a non-thesis Master of Science (M.S.) degree program with a major in Technical Systems Management will be offered through the University of Illinois' Professional Science Masters (PSM) initiative. The College of ACES and Graduate College are seeking to launch this new program as part of the *Illinois* PSM Initiative in Fall 2009. The Technical Systems Management M.S. program with concentration in PSM will be designed as a revenue-generating, three-semester, non-thesis M.S. degree, wherein students will not be eligible for receipt of a Tuition and/or Fee Waiver. This program will require 42 hours total, 32 hours of the TSM curriculum and 10 hours of the PSM concentration. It is expected that this degree program will be particularly attractive to TSM graduate students who seek mid-level management positions in agricultural, biological, construction and environmental technological industries.

Student enrollment targets for the PSM program are conservatively estimated at 5 to 10 students each year. Therefore, within three years, we anticipate 10-15 students in the TSM program (Thesis and non-thesis), and 10-15 in the PSM Options.

JUSTIFICATION:

The success of the undergraduate program in TSM, currently with approximately 100 students, compared to less than 25 students twenty years ago, provides an opportunity to develop a graduate level program to meet the needs of employers of TSM graduates. Currently, UIUC TSM graduates desiring an M.S. degree continue their education in other programs at UIUC or other Universities with similar TSM M.S. programs. A formal survey of past graduates conducted by the department found many graduates would prefer to continue their education at UIUC in a TSM graduate program. Exit interviews of graduating TSM undergraduates indicate that approximately 30% would consider pursuing an M.S. degree in TSM immediately upon completion of their B.S. program, supporting our earlier estimate of 20 to 30 students in the early years of the program. In addition, hosted within our top ranked ABE Department (#1 for 2006, 2007 and 2008 by US News and World Report), we expect an influx of TSM graduate applicants from other universities in future years.

Agricultural and Biological Engineering (ABE) faculty frequently have important research projects that cannot be adequately addressed through engineering design or analyses alone (e.g., equipment/product testing); the solutions to such problems are often best achieved through an applied approach. Students pursuing an M.S. in TSM will gain a competitive advantage in industry, while expanding research opportunities in ABE.

Technical Systems Management alumni inform us that the graduate education opportunities in this relatively new, expanding field of study are limited. Many indicate that their employers are willing to support professional development activities. It is believed that a significant number would consider pursuing a graduate degree in TSM. Many consider pursuing an MBA degree, but would like to take additional course work related to innovative technologies as well as systems management. The ABE faculty believe that an excellent opportunity exists to serve the needs of the growing population of TSM professionals once the program is established.

BUDGETARY AND STAFF IMPLICATIONS:

a. Additional staff and dollars needed

No additional staff or financial resources are anticipated in the first three years of the program. ABE faculty members currently advise graduate students and can provide necessary advising for TSM graduate students. It is likely the total number of graduate students advised by the department will reach past total numbers of graduate students, with the combination of Agricultural & Biological Engineering (ABE) MS, ABE PhD and TSM MS students, rather than ABE graduate students only.

b. Internal reallocations:

It is anticipated that a maximum of 30 TSM MS students will be in the program at any given time, divided between a 1.5 and a 2.0 year program, both of which have several elective classes to choose from. The core courses that are required of these students have been approved and staffed, and new courses are in development. We anticipate a maximum increase of only 5-7 students in the enrollment of any other individual elective courses in the department. So increases in numbers of sections will not be necessary until after the program is established, at which time tuition revenue from the PSM program will be used to fund the continued growth of the program.

c. Effect on course enrollments in other departments:

As with internal reallocations, the relatively low numbers, and the fact that most of the courses required in this new program are within our department, at least within the context of historical enrollments and those of other programs, will result in minimal impact. One logical effect will be to shift enrollment from those courses historically taken by ABE graduate students (mainly College of Engineering) to ones more oriented to the new program (likely College of ACES). The impact on individual courses in specific semesters is likely to be a few students, at most.

d. Impact on library, computer use, laboratory use, equipment, etc.

Given that we expect the growth in the new program to be gradual for the first few years as it becomes established, the impact on resource requirements will be minimal. As numbers increase, the revenue generated as a result of the PSM component of the program, will support required additional resources.

GUIDELINES FOR UNDERGRADUATE EDUCATION: Not applicable

EFFECTIVE DATE: Upon approval

Clearances:

Sponsor: Joe Harper, Professor and TSM Coordinator	Date 10/15/08
Sponsor	Date
Chair, Courses and Curricula Comm., Dept. of Ag & Bio Eng	Date 10/24/08
Chair, Graduate Committee, Dept. of Ag & Bio Eng	Date 10/27/2008
Head, Dept. of Ag & Bio Eng	Date 10/27/08
Chair, Courses and Curricula Comm., College of ACES	Date 12/9/08
Dean, College of ACES	Date 12/12/08
Chair, Program Subcommittee, EC Graduate College	Date
Chair, Executive Committee Graduate College	Date 4/22/09
Chair, Senate Committee on Ed. Policy	Date

Statement for Bulletin [base is current statement for Agricultural and Biological Engineering Department, with underlined additions; all else is unchanged]:

GRADUATE DEGREE PROGRAMS

The Department of Agricultural and Biological Engineering offers two Master of Science degrees and a Doctor of Philosophy degree.

Admission

Admission requirements for either master's program include completion of an undergraduate program equivalent to the Agricultural & Biological Engineering (ABE) curriculum (in the case of the ABE M.S.) or the Technical Systems Management (TSM) curriculum (in the case of the TSM M.S.) with at least a 3.0 grade point average (A = 4.0) for the last 60 semester hours of coursework. Applicants must submit Graduate Record Examination (GRE) scores, and those applicants whose native language is not English must present a Test of English as a Foreign Language (TOEFL) score of 570 or more on the paper-based test (230 or higher on the computer-based version) or 88 or more on the iBT test.

Admission to the Ph.D. program is limited to individuals who have demonstrated exceptional ability through outstanding performance in obtaining the Master of Science degree and/or through a high degree of technical and professional accomplishment. Candidates must also satisfy entrance requirements for the ABE M.S. degree program.

Graduate Teaching Experience

Experience in teaching is considered a vital part of the graduate program and is recommended as part of the academic work of all Ph.D. candidates in this program.

Degree Requirements

For the TSM M.S. required courses for all graduate programs include TSM 501 and TSM 502, one course in statistics, one course in research methods including experimental design and one 500 level course (in the elective list) are required.

Master of Science, Technical Systems Management

Required Courses	Thesis Option-Required Hours	Non-thesis Option-Required Hours	PSM Concentration-Required Hours

1 course in research methods including experimental design	3-5	3-5	3-5
1 course in statistics	3-5	3-5	3-5
1 500-level course from the departmental elective list	3-5	3-5	3-5
TSM 501and 502	2	2	2
TSM 594 Graduate Seminar	0, enrollment required every semester	0, enrollment required every semester	0, enrollment required every fall semester
PSM concentration courses			10
Internship	N/A	N/A	0
Research/Project Hours (min/max applied toward degree):			
Thesis Hours Required (min/max applied toward degree):	8		
Total Hours	33	36	42
Minimum 500-level Hours Required Overall:	12	12	12
Minimum Hours Required in the Unit Overall:	8	8	8
Other Requirements:*			
Minimum GPA:	2.75	2.75	2.75

The completion of 33 hours (25 h formal course and 8 h research) and the preparation and defense of a thesis involving an analytical or experimental investigation (which satisfies 8 hours of credit) are required of M.S. candidates in both degree programs unless a waiver of thesis is granted. At least 12 hours for the M.S. degree must be in 500-level courses and 8 hours must be in the program rubric. Candidates who are permitted to pursue a non-thesis degree must complete a minimum of 36 hours. Non-thesis TSM graduate students pursuing the

Professional Science Masters (PSM) option are required to complete the PSM concentration courses (ten additional credit hours, totaling 42 credit hours). Students may concentrate study in one of the areas of research specialization listed below. Supporting coursework options include: mathematics; computer science; statistics; engineering mechanics; civil and environmental engineering; electrical and computer engineering; mechanical engineering; industrial engineering; general engineering; natural resources and environmental sciences; agricultural communication; agricultural education; food science and human nutrition; animal sciences; agricultural and consumer economics; business management; finance; labor and industrial relations; crop sciences and other appropriate fields.

FINANCIAL AID

Financial assistance in the form of full or partial waiver of tuition and fees is NOT available to Illinois PSM students. For all other students, fellowships, supported both by University and by College of Agricultural, Consumer and Environmental Sciences funds, are available on a competitive basis. A limited number of assistantships, providing both teaching and research experience, are usually available on a half-time basis.

APPENDICES:

Appendix A: Proposed Curriculum for the M.S. Degree with a Major in Technical Systems Management (TSM).

Appendix B: Proposed Sequencing for the M.S. Degree with a Major in Technical Systems Management.

Appendix C: Proposed Curriculum for the M.S. Degree with a Major in Technical Systems Management and Concentration in Professional Science Masters (PSM).

Appendix D: Key Features of the PSM Concentration to be Coupled with the Proposed M.S. Major in Technical Systems Management Required Courses.

Appendix E: Proposed Sequencing for the M.S. Degree with a Major in Technical Systems Management and Concentration in Professional Science Masters(PSM).

Appendix F: Approvals to include courses from supporting disciplines for the proposed M.S. in Technical Systems Management.

Appendix A. Proposed Curriculum for the M.S. Degree with a Major in Technical Systems Management (TSM).

The M.S. degree with a Major in Technical Systems Management has the following course work that must be completed by all students to fulfill the degree requirements with a minimum of 12 credit hours required at the 500-level:

Core Requirements

TSM 501 Graduate Research I
TSM 502 Graduate Research II
TSM 594 Graduate Seminar
One course in statistics
One course in research methods

Technical Systems Management M.S. Degree Electives: (minimum 3 credit hours are required)

TSM 421 Ag. Safety-Injury Prevention
TSM 422 Ag. Health-Illness Prevention
TSM 425 Applying Safety Interventions
TSM 435 Electronic Microcomputer Control Systems
TSM 436 Renewable Energy Systems
TSM 455 Erosion and Sediment Control
TSM 464 Engine and Tractor Power
TSM 465 Chemical Application Systems
TSM 486 Grain Bioprocessing Coproducts
NRES 510 Adv Natural Resource Economics
TE 461 Technology Entrepreneurship
TE 560 Managing Advanced Technol I
TE 561 Managing Advanced Technol II
UP 546 Land Use Policy and Planning

Appendix B. Proposed Sequencing for the M.S. Degree with a Major in Technical Systems Management.

Year 1

Fall Semester:

Technical Systems Management Coursework (8 hours)
- TSM 501 Graduate Research I
- One course in statistics or research methods
- TSM 594 Graduate Seminar
- Electives

Spring Semester:

Technical Systems Management Coursework (9 hours)
- TSM 502 Graduate Research II
- One course in statistics or research metohds
- TSM 594 Graduate Seminar
- Electives

Year 2

Fall Semester

Technical Systems Management Coursework (8 hours)
- TSM 594 Graduate Seminar
- Electives

Spring Semester (8 hours)
- TSM 599 Thesis Research
- TSM 594 Graduate Seminar
- Non-thesis candidates must complete a minimum of 11 hours of additional coursework in place of the thesis research.

Hours:

25 Hrs Technical Systems Management core and electives
8 Hrs Research
33 Total (36 total hours for non-thesis)

Appendix C. Proposed Curriculum for the M.S. Degree with a Major in Technical Systems Management and Concentration in Professional Science Masters (PSM).

The M.S. degree with a Major in Technical Systems Management and Concentration in PSM curriculum has the following three categories of coursework that must be completed by all students to fulfill the degree requirements:

1. Core Requirements:

TSM 501 Graduate Research I
TSM 502 Graduate Research II
TSM 594 Graduate Seminar
One course in statistics
One course in research methods

2. Technical Systems Management M.S. Degree Electives: (minimum 3 credit hours are required)

TSM 421 Ag. Safety-Injury Prevention
TSM 422 Ag. Health-Illness Prevention
TSM 425 Applying Safety Interventions
TSM 435 Electronic Microcomputer Control Systems
TSM 436 Renewable Energy Systems
TSM 455 Erosion and Sediment Control
TSM 464 Engine and Tractor Power
TSM 465 Chemical Application Systems
TSM 486 Grain Bioprocessing Coproducts
NRES 510 Adv Natural Resource Economics
TE 461 Technology Entrepreneurship
TE 560 Managing Advanced Technol I
TE 561 Managing Advanced Technol II
UP 546 Land Use Policy and Planning

3. **PSM Concentration Requirements** - 10 hours of coursework required for all students in the program that provides business fundamentals, as part of the proposed campus-wide PSM initiative. Key features of the PSM curriculum related to the proposed Technical Systems Management major are summarized in **Appendix E.**

Appendix D. Key Features of the PSM Concentration to be Coupled with the Proposed M.S. Major in Technical Systems Management Required Courses

There are three components of the PSM concentration:

1. Business curriculum (courses listed in table below)
2. Industry seminar series (PSM 501, 502, and 503)
3. Internship (PSM 555)

Business Curriculum (10 hours)

The business curriculum is a sequence of eight courses jointly delivered by the School of Labor and Employment Relations (LER) and the College of Business. These courses, common across all PSM programs, are intended to provide PSM students with core business knowledge and skills. The business curriculum totals 10 semester credit hours in an intensive, focused delivery. The requirements are summarized below.

Term / Semester	Course	Title	Instructional Unit	Credit Hours
1 - Fall	PSM 510	Managerial Accounting	Business	1
1 - Fall	PSM 511	Financial Management	Business	1
1 - Fall	PSM 512	People and Technology at Work	LER	2
2 - Spring	PSM 520	Technology Management	Business	1
2 - Spring	PSM 521	Strategic Decision Making	Business	1
2 - Spring	PSM 522	Human Resource Management for Scientists and Engineers	LER	2
3 - Fall	PSM 530	Entrepreneurship	Business	1
3 - Fall	PSM 531	Marketing	Business	1

Industry Seminar Series (0 hours)

The industry seminars provide opportunities for intellectual and social engagement for students across Illinois PSM programs. The seminars extend the professional preparation provided in the business curriculum. A key element of the seminar is invited guest lecturers in significant science-related leadership roles from business, industry, and governmental organizations. Discussions will center on the problems and challenges introduced by the guest lecturer. All PSM students will enroll in a common seminar each semester, blending students from multiple disciplines to explore issues in common. Students in PSM programs have similar career aspirations and will thus benefit from exploring management, leadership, and career development issues together. Students will have the opportunity to learn about these issues not only as they relate to their specific area of study, but also to those in other Illinois PSM programs. PSM students will enroll in the seminar each semester in which they are enrolled in the cohort program (PSM 501, 502 and 503, respectively), excluding summer. In the final semester seminar,

an emphasis is on learning from the internship experience during the preceding summer term and mentoring first semester students who are preparing for the internship. These courses carry 0 credit hours and assign S/U (satisfactory/unsatisfactory) grades.

Internship (0 hours)

The internship is judged a necessary component of a professional graduate degree program whose goal is to produce graduates proficient in their science area of study with the knowledge, skills, and abilities to apply their proficiency to managerial and leadership challenges of business, government, and not-for-profits. Nationally, the majority of PSM programs require internships. Having completed two semesters of full-time graduate study before the internship, students will have had adequate science and business coursework to prepare them for work experiences in organizations. First semester students will be paired with third semester students for internship mentoring. Students will formulate plans for securing an internship early in their first semester of study as part of the required industry seminar series (PSM 501) and will implement plans no later than the beginning of their second semester of study. Students will evaluate their internship experience as part of their third semester industry seminar (PSM 503). Students complete one semester of full-time study after the internship is completed. The criteria for selection of internship companies and positions are determined for each student individually. In consultation with the program coordinator, students find internship companies and positions that match their individual career objectives and meet the learning goals of the program. The student bears the principal responsibility for securing the internship. The program coordinator determines student deliverables and evaluation criteria and assigns course grades (S/U only). Internationals holding student visas must have prior authorization from International Student and Scholar Services.

Appendix E. Proposed Sequencing for the M.S. Degree with a Major in Technical Systems Management and Concentration in Professional Science Masters (PSM).

Year 1

Fall Semester:

Technical Systems Management Coursework (10 Hours)
- TSM 501 Graduate Research I
- One course in statistics or research methods
- TSM 594 Graduate Seminar
- Electives

PSM Concentration Coursework (4 Hours)
- PSM 512 – People and Technology at Work (2 Hrs)
- PSM 501 – PSM Seminar I (0 Hr)
- PSM 510 – Managerial Accounting (1 Hr)
- PSM 511 – Financial Management (1 Hr)

Spring Semester:

Technical Systems Management Coursework (10 Hours)
- TSM 502 Graduate Research II
- One course in statistics or research methods
- TSM 594 Graduate Seminar
- Electives

PSM Concentration Coursework (4 Hours)
- PSM 520 – Technology Management (1 Hr)
- PSM 521 – Strategic Decision Making (1 Hr)
- PSM 522 – HR for Scientists + Engineers (2 Hrs)
- PSM 502 – PSM Industry II (0 Hr)

Summer Semester:

Internship
- PSM 555 – PSM Internship (0 Hr)

Year 2

Fall Semester

Technical Systems Management Coursework (12 Hours)
- TSM 594 Graduate Seminar
- Electives

PSM Concentration Coursework (2 Hours)
- PSM 503 – PSM Seminar III (0 Hr)
- PSM 530 – Entrepreneurship (1 Hr)
- PSM 531 – Marketing (1 Hr)

Students who need additional time to complete courses may remain for another semester

Hours:

32 Hrs Technical Systems Management core and electives
+ 10 Hrs Professional Science Masters Concentration
= 42 Total

Appendix F: Approvals to include courses from supporting disciplines for the proposed M.S. in Technical Systems Management.

Reformatted response the Department of Natural Resources and Environmental Sciences, April 3, 2008.

Joe,

Bruce Branham asked me to respond to your request about listing two NRES graduate courses in your proposed MS in TSM. I asked the instructors of the courses what they thought, and based on their responses we would agree to listing NRES 510, but not 508.

The instructor for 510, Professor Dick Brazee, indicated that he has had TSM students in the past and they had appropriate backgrounds for his course. This course has been offered each fall, and we plan to continue that pattern.

The instructor for 508, Professor Courtney Flint, did not think it would be appropriate for TSM students. This course builds on a strong social science that the students have, and TSM students would likely not have that background. In addition, this course is offered every other year, and is expected to be full with our own students. Professor Flint sees the enrollment maximum at about 15 students, which will likely easily be met without an additional group of students who could include it as an elective.

To summarize, NRES supports listing NRES 510 in your elective courses for the MS degree, and we expect this course to be taught every fall semester.

Mark David
Professor of Biogeochemistry
Associate Head and Teaching Coordinator
University of Illinois
Dept. of Natural Resources and Environmental Sciences

Dear Professor Branham,

The Department of Agricultural and Biological Engineering has developed a proposal for a new Masters of Science degree in Technical Systems Management. As part of the proposal we have developed a listing of technical electives. Because several of these courses (see list below) are in your department we are asking for a brief statement from you or someone in your department that the inclusion of these courses in this set of offerings is acceptable and these courses will be delivered on a regular basis.

Would it be acceptable for us to include these courses in our menu of elective choices? A simple statement of your support via e-mail to me will suffice.

If you have questions or need any additional information, please let me know

Thanks.

Joe Harper
Professor and Technical Systems Management Program Coordinator

NRES Courses Listed in the TSM MS Proposal:

NRES 508 Community & Natural Resources
NRES 510 Adv Natural Resource Economics

Reformatted response the Department of Urban and Regional Planning, April 4, 2008.

Joe,

We are glad to have this course included. Please note that we regularly offer this course on alternating years.

Best wishes,

Ed

Edward Feser, Professor & Interim Head
Department of Urban and Regional Planning, University of Illinois
111 Temple Buell Hall, 611 Taft Drive (MC-619) Champaign, IL 61820
Voice: (217) 244-6767, Fax: (217) 244-1717

Joe Harper wrote:

Dear Professor Feser,

The Department of Agricultural and Biological Engineering has developed a proposal for a new Masters of Science degree in Technical Systems Management. As part of the proposal we have developed a listing of technical electives. Because one of the courses (listed below) is in your department we are asking for a brief statement from you or someone in your department that the inclusion of this course in this set of offerings is acceptable and this course will be delivered on a regular basis.

Would it be acceptable for us to include this course in our menu of elective choices? A simple statement of your support via e-mail to me will suffice.

If you have questions or need any additional information, please let me know

Thanks.

Joe Harper
Professor and Technical Systems Management Program Coordinator

UP Course Listed in the TSM MS Proposal:
UP 546: Land Use Policy and Planning