

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

College of Engineering
Engineering College Curriculum Committee
Vern Schaefer, Chair
vern@iastate.edu
294-9540

Date: January 20, 2012

To: David Holger, Dean of the Graduate College

From: Vern Schaefer, Chair, Engineering College Curriculum Committee



Subject: Proposed Master of Engineering in Engineering Management

Last semester a proposal for a Master of Engineering degree in Engineering Management, was developed by the Industrial and Manufacturing Systems Engineering Department (IMSE). The 'Request to Implement a New Masters Degree Program: Masters of Engineering in Engineering Management' is attached, along with a letter of support from the University of Iowa. The proposal was approved by the IMSE faculty. The Engineering College Curriculum Committee (ECCC) conducted a review of the proposed Master of Engineering proposal and it passed the ECCC unanimously. Subsequent to the ECCC approval, the proposal and recommendation was discussed at a College of Engineering faculty meeting on October 26, 2011 and submitted for electronic voting to the College of Engineering faculty. 169 faculty voted on the issue, with 141 (83.4%) voting yes, 10 (5.9%) voting no, and 18 (10.7%) abstaining or not voting. Thus, the ECCC and the College of Engineering faculty recommend approval of the Master of Engineering degree in Engineering Management.

We now pass this onto the Graduate Council and the Graduate College for their action.

Please let me know if you have any questions or need additional information.

August 31, 2011

Dr. Douglas Gemmill
College of Engineering
Department of Industrial & Manufacturing
Systems Engineering
3004 Black Engineering
Ames, IA 50011-2164

Dear Doug:


Last spring the College of Business Curriculum Committee reviewed the proposed Master of Engineering Management proposal and voted unanimously to recommend its approval to the general faculty of the college.

On May 4, 2011 at a College of Business faculty meeting attended by 44 faculty (about 65% of our faculty), the college approved the proposed Master of Engineering Management proposal with only one vote against. The faculty did require one change in the business courses included in the curriculum, and your revised proposal reflects that change (i.e., including FIN 501 instead of BUSAD/STB 508).

Also, the faculty noted that the College of Business needs to be involved in the administration of the program, so that we are in compliance with AACSB accreditation requirements. Early in the proposal development process, you and I discussed the need and willingness to have joint administration by our two colleges.

The College of Business faculty is enthusiastically supportive of this proposed program, and views it as another excellent opportunity for collaboration between our two colleges.

Sincerely,



Michael R. Crum
Associate Dean for Graduate Programs

Board of Regents, State of Iowa

**REQUEST TO IMPLEMENT A NEW MASTERS DEGREE PROGRAM:
MASTER OF ENGINEERING in ENGINEERING MANAGEMENT**

Institution: **Iowa State University**

Departments involved: **Industrial and Manufacturing Systems Engineering**

CIP Discipline Specialty Title: **Engineering Management**

CIP Discipline Specialty Number (six digits): **15.1501**

Level: B **M** D FP

Title of Proposed Program: **Master of Engineering in Engineering Management**

Degree Abbreviation (e.g., Minor, B.S., B.A., M.A.): **M.Eng.**

Approximate date to establish degree: Month: **May** Year: **2012**

Contact person(s): **Doug Gemmill, 294-8731, n2ddg@iastate.edu**

Gary Mirka, 294-1309, mirka@iastate.edu

Please provide the following information (use additional pages as needed).

1. Describe the proposed new degree program, including the following:
 - a. **A brief description of the program and a statement of objectives including the student learning outcomes and how the learning outcomes will be assessed.**

Engineering Management is a unique discipline that uses engineering skills and knowledge in managing large scale projects. It links all other types of engineers from industrial and mechanical to chemical and electrical in accomplishing organizational results through the leadership of knowledge-workers and the appropriate application of technology. – American Society for Engineering Management

The Master of Engineering in Engineering Management will prepare engineers for leadership/management positions within their organizations. The program will give the students the knowledge and skills necessary to manage and develop a highly qualified and trained staff of engineers, scientists, and technicians in a rapidly changing technological environment.

Learning outcomes are:

Students will have knowledge of the core competencies necessary for effective engineering management.

Students will have an understanding of the management of innovation or entrepreneurship within the organization.

Students will understand how to manage engineers/technologists and skills development for engineers.

Students will have knowledge of the necessary processes and tools and develop the skills to effectively manage both simple and complex projects.

Students will have the ability to investigate and synthesize the needs of marketing, sales, engineering, accounting, finance, manufacturing, and service.

Students will have the ability to implement strategy in light of the legal, regulatory, economic, social, and political contexts of business.

Students will have an understanding of the ethical issues, moral dilemmas, and stakeholder responsibilities embraced by today's corporate decision makers.

Learning outcomes would be assessed by:

A variety of assessment tools will be utilized with the makeup of the tools dependent on individual course student learning outcomes, and as codified by the Higher Learning Commission, the accreditation body for degree-granting post-secondary educational institutions in the North Central region.

b. The relationship of the proposed new program to the institutional mission and how the program fits into the institution's, college's, and department/program's strategic plan.

This proposed graduate degree in engineering management will integrate science, technology, engineering, and management. As such, it is congruent with the university's mission to provide a venue for collaboration both within our academic community by fostering cross-disciplinary cooperation, as well as outside the university through collaboration with various corporate entities in the state of Iowa and the world beyond its borders.

Within the College of Engineering in general, part of the stated mission is to fulfill the unmet need for technically educated leadership which this program directly addresses. Another mission of the college is to partner with and increase the return on investment of our stakeholders through a highly educated and valued workforce and improved economic vitality of the state and region. We worked directly with our industrial stakeholders in development of the engineering management curriculum in order to address their stated need for a program that addresses both engineering and general management skills development.

Part of the stated mission of the Department of Industrial and Manufacturing Systems Engineering (IMSE) is to establish itself as a leader among academic departments of industrial engineering. Offering a program in engineering management will increase the department's visibility with engineers both within the state of Iowa and outside its borders and demonstrate leadership in providing a program that is in demand by industry.

The IMSE Department will have the main role for the administration and governance of the Engineering Management program. Students admitted to the Engineering Management program will have a home department in IMSE. The

College of Business will review and advise the program regarding any changes in the curriculum or admissions policies.

- c. The relationship of the proposed new program to other existing programs at the institution; describe how the proposed program will enhance other programs at the university.**

The Masters of Engineering in Engineering Management will provide students with a unique combination of knowledge and skill not presently offered at ISU. With the exception of one new course, this will be accomplished using courses already existing at ISU. The IMSE department worked closely with the College of Business (CoB) in the development of the engineering management program. One-half of the credits required for the degree will come from courses offered by the CoB. Therefore, the program will potentially result in increased collaboration between the two colleges. Through the proposed curriculum with its collaboration between engineering and business, graduate students will be engaged outside the walls of the CoE. It also presents the chance for increased faculty collaboration between the two colleges. The program will increase student credit hours for both the CoE and the CoB.

Within the College of Engineering (CoE) the program could eventually lead to a minor in engineering management which would be available to students from any engineering discipline. This provides an opportunity for increased cross-disciplinary exposure for the students.

- d. The relationship of the proposed new program to existing programs at other colleges and universities in Iowa, including how the proposed program is different or has a different emphasis than the existing programs.**

There are no engineering management programs at other colleges and universities in Iowa.

- e. Special features or conditions that make the institution a desirable, unique, or appropriate place to initiate such a degree program.**

Iowa State University is well known for the quality of its engineering programs and has one of the larger colleges of engineering in the nation. The ISU College of Engineering (CoE) has an excellent reputation with industry for its quality of education which is demonstrated by the size of the engineering career fair each fall (the largest indoor career fair with over 270 employers represented).

It is expected that the typical student in this program will be a distance education student who is taking classes part-time while they are full-time employed. The CoE at ISU has a very long tradition of offering distance education courses and has an excellent infrastructure already in place in the Engineering Online Learning office. There are a number of very successful distance masters of engineering programs such as the Systems Engineering program which has around 100 distance students active in the program every year. Recently the College of Business (CoB) has significantly grown its distance education efforts, and the CoE has worked with the CoB to offer some of the CoB courses.

The IMSE department and the College of Business have developed an excellent working relationship. One example is the concurrent BSIE/MBA program that is now available to our students (other engineering programs also have BS/MBA concurrent programs, but BSIE/MBA accounts for over 50% of the graduates in these programs). IMSE has also worked closely with the CoB to develop a sales engineering minor. IMSE and CoB continued to work closely together to develop the proposal for the Engineering Management program. These strong ties provide an excellent environment for the engineering management program which inherently requires cooperation between business and engineering.

Another distinguishing feature of our program is the unique combination of engineering and business courses. We have worked closely with the business college to purposefully take this approach to distinguish this program from similar programs.

f. Does the proposing institution have personnel, facilities, and equipment adequate to establish and maintain a high quality program?

As noted above the typical student for this program will be a distance education student. The CoE already has an excellent infrastructure in place to offer distance education courses including 1) distance education classrooms with the necessary technology for recording distance education courses, 2) technicians with the experience to provide professional delivery of lectures to the students, and 3) a very experienced support staff in the Engineering Online Learning office. In addition our faculty has many years of experience in delivering distance education courses. Iowa State has long been recognized for its excellent distance education program.

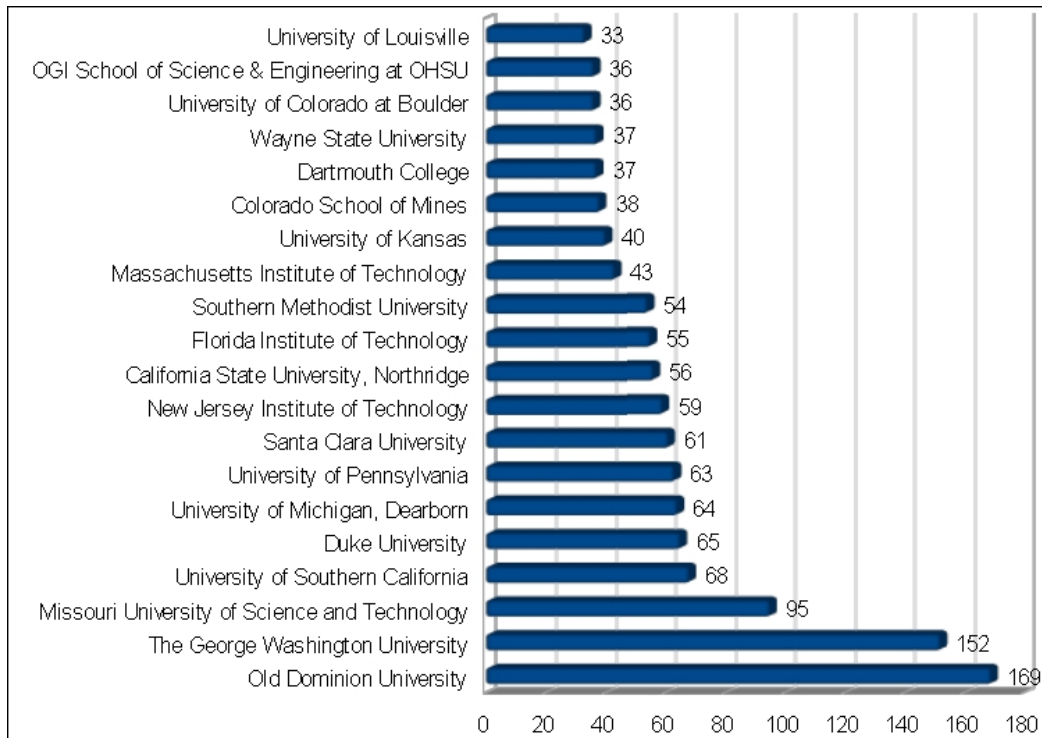
All but one of the courses that will be included in the program are already offered at Iowa State. The CoE and CoB already have the faculty necessary to teach the courses with the exception of hiring either a lecturer or tenure track faculty who would be responsible for teaching the new course which focuses on the management of engineers, technology, and innovation (see Section 11).

g. How does student demand for the proposed program justify its development?

The development of the engineering management proposal was initiated after consulting with many of our industrial partners (such as Rockwell Collins and John Deere). Our industrial partners requested that we provide a graduate degree that provides their engineers, as part of their professional development, the opportunity to gain more general management skills and at the same time focus on the management of technologists. The consensus was that a degree in engineering management is the best option. These same industries in Iowa have made it clear that they will provide the student demand for such a program.

2. Describe the state and/or national workforce need and/or demand for graduates of the proposed program currently and in the near future (provide documentation about the sources of data used to estimate need and demand.)

A good indication of the need for graduates in engineering management is the increasing number of students participating in degree programs. For example, according to the American Society of Engineering Management the largest programs in engineering management in terms of degrees awarded per year are shown in the table below (source **PRISM Magazine**, March 2008).



The U.S. Bureau of Labor Statistics projects the demand for engineering managers to grow by about 6 percent by the year 2018.

3. List all other public and private institutions of higher education in Iowa currently operating programs similar to the proposed new degree program. (For comparison purposes, use a broad definitional framework, e.g., such identification should not be limited to programs with the same title, the same degree designation, having the same curriculum emphasis, or purporting to meet exactly the same needs as the proposed program.)

There are no other engineering management programs in Iowa.

If the same or similar program exists at another public or private institution of higher education in Iowa, respond to the following questions:

- a. Could the other institution reasonably accommodate the need for the new program through expansion? Through collaboration?
- b. With what representatives of these programs has there been consultation in developing the program proposal? Provide a summary of the response of each institution consulted.
- c. Has the possibility of an inter-institutional program or other cooperative effort been explored? What are the results of this study? (Consider not only the possibility of a formally established inter-institutional program, but also how special resources at other institutions might be used on a cooperative basis in implementing the proposed program solely at the requesting institution.)

4. Estimate the number of majors and non-majors students that are projected to be enrolled in the program during the first seven years of the program.

a. Undergraduate

Undergraduate	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7
Majors	N/A						
Non-Majors							

b. Graduate

Graduate	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7
Majors	20	40	60	80	100	100	100
Non-Majors	0	0	0	0	0	0	0

c. What are the anticipated sources of these students?

Initially the anticipated sources of these students will come from industrial partners within that state of Iowa such as Rockwell Collins and John Deere (see letters of support). The history of our Systems Engineering program began with sources from Iowa industry and then grew to sources well beyond our state borders (it is now a program with a steady state census of around 100 students). We expect the engineering management program to parallel this experience.

5. **If there are plans to offer the program away from the campus, briefly describe these plans, including potential sites and possible methods of delivery instruction.**

This proposed program will be offered primarily through distance education. Engineering Online Learning will provide the technical support to capture and deliver these courses to students around the world.

6. **Has the proposed program been reviewed and approved by the appropriate campus committees and authorities? List them:**

The following have reviewed and approved the program:

- Industrial & Manufacturing Systems Engineering Curriculum Committee
- Industrial & Manufacturing Systems Engineering Faculty
- Engineering College Curriculum Committee
- Business College Curriculum Committee

The proposal will be forwarded to the following for review and approval:

- Graduate College Curriculum and Catalog Committee
- Graduate Council
- Graduate Dean
- Faculty Senate Curriculum Committee
- Faculty Senate

7. **List date the program proposal was submitted to the Iowa Coordinating Council for Post High School Education (ICCPHSE) and the results of listserv review. (THIS WILL BE FILLED IN BY THE PROVOST OFFICE.)**

8. **Will the proposed program apply for accreditation? When?**

No.

9. **Will articulation agreements be developed for the proposed program? With whom?**

No.

10. **Describe the faculty, facilities, and equipment that will be required for the proposed program.**

Existing courses will be drawn together to form this new degree program. One new course will be developed which will focus on managing engineers, technology, and innovation. The CoE and CoB already have the faculty necessary to teach the courses with the exception of hiring either a lecturer or tenure track faculty who would be responsible for teaching the new course (see Section 11).

The courses will be offered through the CoE Engineering Online Learning (EOL) facilities. EOL's facilities are excellent for offering distance education courses and have the necessary capacity to handle the additional course load (many of the courses required for the proposed program are already offered through EOL).

11. From where will the financial resources for the proposed program come (list all that apply, e.g., department reallocation, college reallocation, grants, new to the university)?

New Faculty Salary estimated \$80,000 + 30% Fringe = ~\$104,000

SOURCES	TOTAL AMOUNT
One new faculty line reallocated from the college	\$104,000

12. Estimate the total costs/total new costs (incremental increases each year in expenditures) that will be necessary for the next seven years as a result of the new program:

	TOTAL COSTS	TOTAL NEW COSTS
Year 1	\$41,600	\$41,600
Year 2	\$1,248	\$1,248
Year 3	\$1,285	\$1,285
Year 4	\$1,324	\$1,324
Year 5	\$1,364	\$1,364
Year 6	\$1,405	\$1,405
Year 7	\$1,447	\$1,447

Of the new faculty salary, 40% will be dedicated to teaching new course(s) and administering the new M.Eng. Degree program in Engineering Management: 40% of \$104,000 = \$41,600. The incremental cost in subsequent years is incremented at a rate of 3%.

Supplemental materials (to be used at Iowa State University in the review of the proposal):

13. Program requirements, including:

- a. prerequisites for prospective students.

Bachelor of Science in Engineering

- b. language requirements.

None

- c. courses and seminars presently available for credit toward the program.

Required

Finance 501 Financial Valuation and Corporate Financial Decisions (3)
 Mkt 501 Marketing (3)
 Mgmt 503 Ethical Leadership and Governance in Business (3)
 Mgmt 504 Strategic Management (3)
 SCM 524 Strategic Process Analysis and Improvement (3)
 Con E 380* Engineering Law (3)
 IE 541 Inventory Control and Production Planning (3)
 IE 570 Systems Engineering and Project Management (3)

IE 588 Information Systems for Manufacturing (3)

*The use of ConE 380 in this program has been discussed with the Civil, Construction & Environmental Engineering Department and has their support.

d. proposed new or modifications of existing courses.

New engineering course focused on managing engineers, technology, and innovation.

e. thesis and non-thesis options in master's programs.

This is a non-thesis (coursework only) masters degree. A total of 30 course credits are required to complete the program. All students must take the 10 courses outlined in Sections 13.c and 13.d.

f. implications for related areas within the university.

Since the program is primarily directed to distance students there will be minimal impact on university services.

g. admissions standards for graduate programs.

Admission standards will require an undergraduate GPA of at least 3.0 (B average) and a BS degree in any area of engineering. The GRE or GMAT will not be required. Applicants who do not meet these general standards will be evaluated on an individual basis.

14. Attach to the program proposal memos from the department chair(s), the college dean(s), and other appropriate persons, agreeing to the allocation of new resources and/or the reallocation of resources as described in the Regents questions

See attached memos from the College of Engineering Dean's office and from the Chair of the IMSE Department.

15. Attach to the program proposal, letters of support, recommendations, and statements when appropriate:

a. from programs at the other Regents universities

University of Iowa
University of Northern Iowa

b. from programs and departments at ISU which are associated with the proposed program or have an interest in the proposed program

ISU College of Business

c. from industrial partners that have an interest in the proposed program

John Deere

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

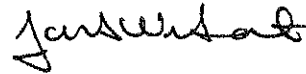
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Interoffice Communication

DATE: 23 September 2011

TO: Dave Holger
Dean, Graduate College
1550 Beardshear Hall

FROM: Jonathan Wickert
Dean, College of Engineering



SUBJECT: Faculty line for engineering management program

The College of Engineering has committed three new faculty lines over the next three years to the Department of Industrial and Manufacturing Systems Engineering. The chair of the department, Dr. Janis Terpenny, has the authority to deploy those hires to best meet the strategic needs of the department as aligned with the college.

JW/jh

IOWA STATE UNIVERSITY


College of Engineering
Department of Industrial and
Manufacturing Systems Engineering
3004 Black Engineering Building
Ames, Iowa 50011-2164
Tel. 515 294-1682
FAX 515 294-3524
www.imse.iastate.edu

Memorandum

Date: September 29, 2011

Subject: Faculty line for engineering management program

To: Dave Holger
Dean, Graduate College
1550 Beardshear Hall

From: Janis P. Terpenny 
Department Chair and Joseph Walkup Professor

This memo is to relay my full endorsement of the proposed Engineering Management program and commitment to support its success with one of the three faculty lines that have been provided to the department of Industrial and Manufacturing Systems Engineering with my hire.

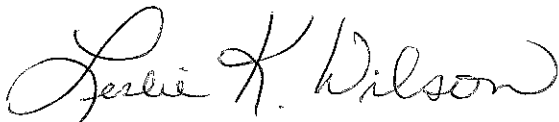
19 July 2011

Janis Terpenny
Chair, Industrial and Manufacturing Systems Engineering
Iowa State University
Ames, IA 50011

Dear Dr. Terpenny,

The College of Business Administration at the University of Northern Iowa has NO objection to the development of the proposed Masters of Engineering Management. I wish you the best with this new on-line endeavor.

Sincerely,



Leslie K. Wilson
Associate Dean
MBA Program Director



JOHN DEERE

Deere & Company
One John Deere Place, Moline, IL 61265 USA

Klaus G. Hoehn
Vice President
Advanced Technology & Engineering

16 August 2011

Dr. Janis Terpenny
Chair, IMSE Department
3004 Black Engineering
Iowa State University
Ames, IA 50011

Dear Dr. Terpenny,

This letter is to inform you of John Deere's interest in the Masters in Engineering Management degree program currently under consideration at Iowa State. Over the past 10 years, John Deere has participated in the EMBA and masters in engineering program offered jointly by Iowa and Iowa State. This program has enabled us to provide advanced education to managers whose background and focus is engineering.

In on-going discussions with Dr. Doug Gemmill and others, we felt the current offering, masters in systems engineering, was more suited to developing advanced technical professionals than managerial professionals. Members of my staff and others at John Deere provided input to Dr. Gemmill regarding content that would be of interest to us in developing our engineering managers. Dr. Gemmill and the IMSE Department have considered this input and proposed a Masters in Engineering Management degree be developed and offered from Iowa State.

I believe a Masters in Engineering Management, as part of the joint program or a standalone degree, is an advanced degree that would assist in the professional development of John Deere engineers who have chosen a managerial focus for their career.

I look forward to hearing more about this offering and promoting it to our employees if it becomes available in the future.

Best regards,

Klaus Hoehn



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800-MBA-IOWA
iowamba@uiowa.edu
www.biz.uiowa.edu/mba

December 9, 2011

Janis Terpenny
Chair, Industrial and Manufacturing Systems Engineering
Iowa State University
Ames, IA 50011

Dear Dr. Terpenny,

The Henry B. Tippie College of Business at The University of Iowa has NO objection to the development of the Masters degree in Engineering Management. This degree is not offered at The University of Iowa.

Sincerely,

A handwritten signature in black ink, appearing to read "Jarisu Sa-Aadu".

Jarisu Sa-Aadu
Associate Dean
Henry B. Tippie School of Management