

FORM A  
Board of Regents, State of Iowa

**REQUEST TO IMPLEMENT A NEW BACCALAUREATE, MASTERS,  
DOCTORAL, OR FIRST PROFESSIONAL DEGREE PROGRAM  
REVISED APRIL 30, 2009**

THE PURPOSE OF ACADEMIC PROGRAM PLANNING: Planning a new academic degree program provides an opportunity for a Regent university to demonstrate need and demand as well as the university's ability to offer a quality program that is not unnecessarily duplicative of other similar programs offered by colleges and universities in Iowa.

Institution: IOWA STATE UNIVERSITY  
 CIP Discipline Specialty Title: MATERIALS SCIENCE  
 CIP Discipline Specialty Number (six digits): 40.1001  
 Level: B \_\_\_\_\_ M X D \_\_\_\_\_ FP \_\_\_\_\_  
 Title of Proposed Program: Master of Engineering in Materials Science and Engineering  
 Degree Abbreviation (e.g., B.S., B.A., M.A., Ph.D.): M. Engr.  
 Approximate date to establish degree: Month May Year 2010  
 Contact person: (name, telephone, and e-mail) Alan Russell, 515-274-3204, russell@iastate.edu  
 College that will administer new program: College of Engineering

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

**ITEMS 1-3 AND 5-10  
ARE WRITTEN ON  
ATTACHED PAGES.**

1. Describe the proposed new degree program, including the following:
  - a. A brief description of the program and a statement of academic objectives;
  - b. The relationship of the proposed new program to the institutional mission and how the program fits into the institution's and college's strategic plan;
  - 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.
  - 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.
  - e. Special features or conditions that make the institution a desirable, unique, or appropriate place to initiate such a degree program.
  - f. Does the proposing institution have personnel, facilities, and equipment adequate to establish and maintain a high quality program?
  - g. How does student demand for the proposed program justify its development?
2. Describe the state and/or national workforce need and/or demand for graduates of the proposed program currently and in the foreseeable future (provide documentation about the sources of data used to estimate need and demand).

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.)

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.)
- d. Do other colleges in Iowa offer programs similar to the proposed program at comparable quality and cost?

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 **NONE**

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

- b. Graduate

Graduate	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7
Majors	3	6	8	8	8	8	8
Non-Majors	0	0	0	0	0	0	0

- c. What are the anticipated sources of these students?

*practicing engineers from Iowa industry plus B.S. degree holders seeking non-thesis masters degree*

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. Will off-campus delivery require additional HLC accreditation?
6. Has the proposed program been reviewed and approved by the appropriate campus committees and authorities?
7. List date the program proposal was submitted to the Iowa Coordinating Council for Post High School Education (ICCPHSE) and results of listserv review.
8. Will the proposed program apply for accreditation? When?
9. Will articulation agreements be developed for the proposed program? With whom?
10. Describe the faculty, facilities, and equipment that will be required for the proposed program.

## FORM A – Board of Regents

1. a . This program will offer a non-thesis masters degree in materials science. Students have repeatedly requested this, particularly prospective students who are currently employed in industry who want to obtain a graduate degree in materials, but who have difficulty performing the research required for a M.S. thesis. The proposed degree would offer such students a more detailed understanding of materials properties, processing, theory, and characterization through an all-coursework, non-thesis program of study.

1. b . This program will support both the teaching and outreach missions of the university by offering a graduate program of study to students who cannot spend the time on campus to perform research for a thesis. It will also provide on-campus students who do not have a research interest an opportunity to learn more about materials.

Items in the University's strategic plan that would be enhanced by an M. Engr. degree in Materials Science are marked in **bold font** on the copy of the strategic plan shown below:

*Iowa State University Strategic Plan (2005-2010)*

*Priorities*

*Iowa State is a leading international, comprehensive university with a wide range of dynamic and diverse programs and initiatives. The university commits to continuously evaluating, improving, and evolving these programs as well as exploring and innovating new areas of inquiry and application.*

*Five priority areas and accompanying goals for 2005-2010 have been identified to reinforce existing strengths and pursue our vision.*

*Education*

*Strengthen undergraduate, graduate, and professional education to enhance student success at Iowa State University and beyond.*

*Goals*

- *Improve the rigor, challenge, and international reputation of academic programs.*
- ***Strengthen students' critical thinking, creative abilities, and communication skills.***
- *Enhance students' understanding of global, cultural, ethical, and diversity issues.*
- ***Create an environment that welcomes students to explore a variety of disciplines and career paths.***
- *Increase interdisciplinary and experiential learning opportunities, such as learning communities, service learning, internships, research experiences, and international exchanges.*
- *Enhance programs for high-ability students.*
- *Partner with K-12 schools and community colleges to facilitate transfer to and student success at Iowa State University.*
- ***Enhance services to enable students to find rewarding careers.***
- *Develop, recognize, and reward excellent teaching.*

*Programs*

***Increase the number of graduate, professional, and research programs that are among the very best -- especially in areas that build on university strengths and address local and global critical needs.***

*Goals*

- *Recruit and retain outstanding faculty who are or will be leaders in their fields.*
- ***Increase the number and elevate the overall quality of graduate and professional students.***
- ***Leverage strengths in science and technology to enhance research and scholarly excellence with emphasis on interdisciplinary initiatives involving biological, materials, and information sciences.***
- *Enhance areas of excellence in the arts, humanities, and social sciences that build on and complement the university's unique strengths.*
- *Improve facilities and support services for research.*
- *Enhance the visibility of outstanding faculty members and staff, research accomplishments, and graduate and research programs.*

*Economic Impact*

*Translate discoveries into viable technologies, products, and services to strengthen the economies of Iowa and the world.*

*Goals*

- *Expand the use of intellectual property developed at Iowa State University.*
- ***Strengthen educational and outreach programs aimed at Iowa's economic, workforce, and technology development.***
- ***Foster an environment that encourages faculty, staff, and students to engage in transfer of technology and entrepreneurial activities.***

*Iowa Life*

*Elevate the state's appeal as a place to live, learn, work, and play.*

*Goals*

- *Strengthen our partnerships and communications with Iowans to better identify, address, and solve problems.*
- *Enhance the vitality of Iowa's communities and well-being of its people.*
- *Promote the wise use of Iowa's resources and build a sustainable future.*
- ***Expand learning opportunities for Iowans of all ages.***
- *Partner with Iowans to strengthen their communities' economies and entrepreneurial capacities.*

*University Life*

*Ensure that the university is a great place to learn and work.*

*Goals*

- *Recruit and retain faculty, staff, and students who are dedicated to individual and organizational excellence and achievement.*
- *Expand the diversity of people, ideas, and cultures, and nurture an environment in which diversity can thrive.*
- *Achieve a sustainable balance between responsibilities and resources that will allow the university to efficiently and effectively realize its vision.*
- *Foster an environment in which all members of the university community can contribute their fullest while pursuing satisfying personal lives.*
- *Provide a rich array of extracurricular opportunities to learn, lead, and enjoy life.*
- *Promote a university that conserves resources and enhances environmental quality.*
- *Maintain the attractiveness of campus and improve the quality of its facilities.*
- *Advance the excellence of the university through enhanced connections between ISU and its family of alumni and friends.*

- *Ensure that intercollegiate athletics programs are models of academic success, integrity, and competitiveness.*

1. c. The program will use the existing courses already in place for graduate education in materials science at Iowa State University, and it will permit a non-thesis option for a masters degree. It will be quite similar to the M.S. degree in Materials Science and Engineering, simply requiring more coursework and removing the thesis requirement that is part of the M.S. degree program.

1. d. There are no other materials science graduate programs in the state of Iowa.

1. e. The Materials Science and Engineering Department at Iowa State University is ranked among the top 25 such graduate programs in the United States (2009 U.S. News & World Report rankings). Since there are no other graduate programs in materials in Iowa, the ISU MSE Department is the only one in Iowa capable of offering such a degree.

1. f. Yes. The faculty, staff, and facilities used to offer the Materials Science and Engineering M.S. and Ph.D. degrees will be available to administer and teach the courses in the proposed M. Engr. degree.

1. g. Although anticipated student numbers are modest, the new program requires no new personnel or new courses, so costs of administering it are just the cost associated with staff time spent advising a larger student body. Thus, the additional cost per student will be extremely low.

2. Materials Science and Engineering graduates are in strong demand in U.S. industry.

The U.S. Bureau of Labor Statistics projection for the decade 2006-2016 states:

*“Materials engineers are expected to have employment growth of 4 percent over the projections decade, slower than the average for all occupations. Although employment is expected to decline in many of the manufacturing industries in which materials engineers are concentrated, growth should be strong for materials engineers working on nanomaterials and biomaterials. As manufacturing firms contract for their materials engineering needs, employment growth is expected in professional, scientific, and technical services industries also.”*

The National Association of Colleges and Employers (NACE) Occupational Employment Statistics Survey reported that 2007 starting salaries for newly graduated B.S. degree recipients in materials engineering (\$56,233) were 4<sup>th</sup> highest among the 15 engineering specialties. NACE did not report data for starting salaries of M.S. or M. Engr. degree holders.

At Iowa State University, Engineering Career Services reported that nine M.S. degree recipients graduated from the MSE Department during 2008-09. Seven of these (78%) secured placement and two were still seeking a position at the time of graduation. (Placement six months after graduation is usually nearly 100%.) The average starting salary of the graduates who had an employment contract was \$62,500/year. These numbers are slightly below the long-term average for M.S. degree recipients in materials science, presumably as a result of the economic recession that began in late 2007.

3. a. There are no other public or private institutions of higher education in Iowa currently operating a graduate program in materials science or materials engineering.
  - b. There have been no consultations because there are no other programs in Iowa.
  - c. No.
  - d. No; there are no other programs of any sort in materials science and engineering in Iowa.
4. (see handwritten copy for numbers to be entered into this table)
5. The courses for the M. Engr. program will be offered on-campus with a distance education component if needed by off-campus students. No additional accreditation requirements apply to this program.
6. The proposed program has been reviewed and approved by the MSE Graduate Program Committee, the MSE general faculty, the College of Engineering Curriculum Committee, the College of Engineering general faculty, the ISU Graduate Council Curriculum Committee, and the ISU Graduate Council, and the ISU Faculty Senate Curriculum Committee. It will be reviewed in the near future by the general ISU Faculty Senate.
7. The program has not been submitted to ICCPHSE, since there are no other programs in materials science and engineering in Iowa.
8. No, there is no graduate-level accreditation in materials science and engineering in the U.S.
9. No.
10. The faculty, facilities, and equipment required for the proposed program will be identical with those for the existing M.S. and Ph.D. programs in Materials Science and Engineering at Iowa State University. The department's faculty roster with descriptions of research and teaching expertise is available at <http://www.mse.iastate.edu/who-we-are/people/directory.html>. Enrollments in the M.S. and Ph.D. program courses never reach class size limits, and successful implementation of the M. Engr. program is not expected to add a sufficiently large number of additional students to require offering second sections of these courses. Since the proposed program will utilize the same courses already being taught for the other two graduate degrees, no new staff, facilities, or equipment will be needed for the new program.

## 11. Financial resources for the proposed program

SOURCES	TOTAL AMOUNT
Current expense budget, MSE Dept.	cost of additional admissions correspondence and long distance telephone calls for additional students, photocopying extra hand-outs for larger class sizes, additional materials and supplies needed for larger enrollments in laboratory courses:  \$150/year when full enrollment target (8 M. Engr. students) is achieved

## 12. Financial resources for the proposed program

	TOTAL COSTS* (MSE Dept. budget)	TOTAL NEW COSTS* (from proposed program)
Year 1	\$3,342,843	\$56
Year 2	\$3,409,670	\$115
Year 3	\$3,477,894	\$156
Year 4	\$3,547,452	\$159
Year 5	\$3,618,401	\$162
Year 6	\$3,690,768	\$166
Year 7	\$3,764,584	\$169

\* assumes an inflation rate of 2% per annum



**DATE:** October 7, 2009

**TO:** Graduate Council

**FROM:** Alan Russell, Director of Graduate Education in Materials Science and Engineering

**RE:** Master of Engineering (non-thesis) degree in Materials Science and Engineering

The Department of Materials Science and Engineering is proposing to add a Master of Engineering (non-thesis) degree, as described on the following pages.

## **Proposal for a Non-thesis M.Eng. Degree in MSE (7 October, 2009)**

### **Admissions standards**

The same admissions standards currently applied to applicants for the MSE M.S. degree program will be applied to applicants to the MSE Master of Engineering (M. Engr.) degree program.

### **Program requirements**

Each student will have a Program of Study (POS) Committee that will include at least one faculty member representing an area outside of the department and at least two MSE faculty members. An MSE faculty member will be designated as the major professor. The POS committee will evaluate the plan of study put forward by the student. The plan of study for this degree option will require a minimum of 30 credit hours of coursework. The major professor will monitor the student's progress and provide guidance on course work selection.

The specific requirements of the M. Engr. program are outlined on the following page.

### **Financial support**

Most students pursuing the M. Eng. degree in MSE will be self-supporting or supported by a corporate employer. Graduate assistantships will not routinely be provided to M. Engr. students in MSE.

## Requirements of the MSE Master of Engineering Degree Program

### 1. COURSEWORK

Required core courses for M. Eng. in MSE degree (9 credits), any three of the following four courses:

- MSE 510 Fundamentals of Structure and Chemistry of Materials (3 cr.)
- MSE 520 Thermodynamics and Kinetics in Multicomponent Materials (3 cr.)
- MSE 530 Solid State Science (3 cr.)
- MSE 540 Mechanical Behavior of Materials (3 cr.)

Other MSE Courses (12 credits, minimum):

In addition to the nine credits from the courses listed above, an additional 12 credits (minimum) of 500- or 600-level courses in MSE. MSE 699 credits may not be used to meet coursework requirements for this degree.

Other Courses (9 credits, minimum):

Courses outside MSE in technical disciplines totaling at least 9 credits. These courses must be 500- or 600-level courses or 300- or 400-level courses carrying non-major graduate designation.

Total = 30 credits (minimum)

### 2. CREATIVE COMPONENT (OPTIONAL)

A creative component is not required for the Master of Engineering degree in Materials Science and Engineering. However, students may elect to complete a creative component as part of this degree. If so, the creative component must be approved by the program of study committee. This may take the form of a literature survey document, a written summary of a demonstration project, or a written summary of a small-scale research project. If the student includes a creative component in the program of study, a maximum of three credits of MSE 599 may be taken as part of the 12 credits of "Other MSE Courses" required. The student will usually prepare a written document as part of the creative component, although the POS Committee may waive that requirement in special cases. The creative component shall be approved by the program of study committee, and the student will defend the creative component during the final oral exam in much the same manner as is done with a M.S. thesis. The creative component is a substantially smaller-scale project than a M.S. thesis, and evaluation of the creative component will be made with that difference in mind.