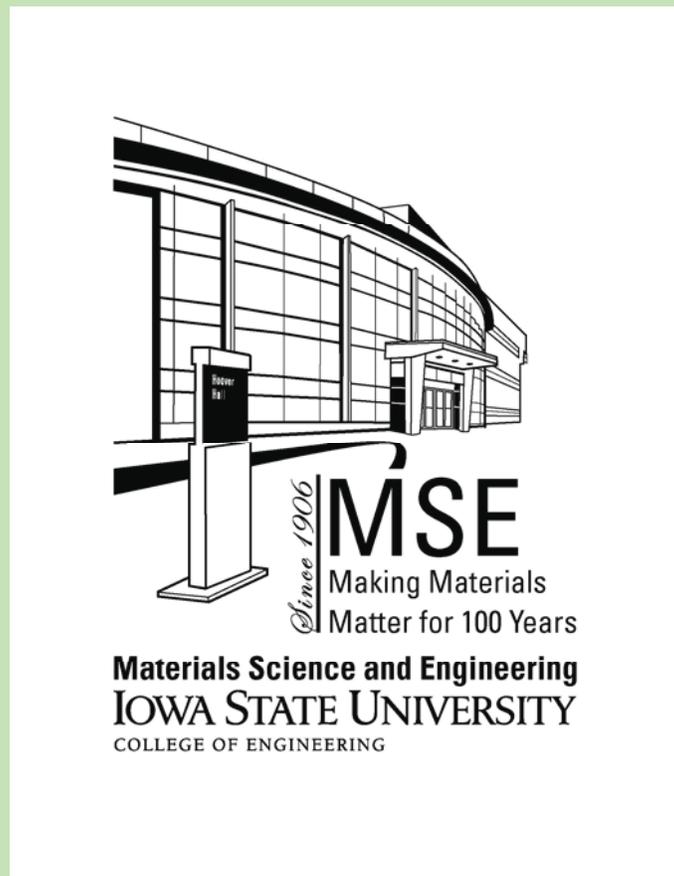


# DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING

## UNDERGRADUATE STUDENT HANDBOOK



**2012-2013**

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**IOWA STATE UNIVERSITY**  
OF SCIENCE AND TECHNOLOGY

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Dear Undergraduate Student:

On behalf of our faculty, staff, and students, I welcome you to our department. You have selected a field that is exciting, demanding, and rewarding. The opportunities and challenges for materials science and engineering graduates are almost endless. Preparing you for these challenges will demand a great deal of effort from you. We are anxious to assist you so that your experience during your undergraduate education is a productive and enjoyable one.

We are very glad you have joined our department. Please do not hesitate to contact me or the Associate Chair, Larry Genalo, or any other member of the faculty for assistance during your tenure in this department.

Wishing you a successful college experience,



Kristen Constant, Chair  
Department of Materials  
Science and Engineering



## I. INTRODUCTION

This booklet has been prepared to help you become acquainted with the personnel, facilities and operations of the Department of Materials Science and Engineering (MSE) of Iowa State University. We hope that it will also provide a starting point in your search for information concerning important activities and procedures with which you will become involved. We hasten to note that the booklet is far from all-inclusive and we realize that it is not "the last word" on all the matters with which it deals. It is intended to supplement other valuable sources of information such as the Iowa State University Bulletin (catalog), The Student Information Handbook, The Iowa State Daily, The Department Bulletin Board, on-line resources and special announcements issued by the departmental and college offices. Certainly, some of the most valuable sources of information available are people, assuming you can find the proper ones. Therefore, another objective for this booklet is to provide some detail concerning the identification and location of individuals who can, and quite happily will, be of help to you in a variety of important areas.

We hope you will read the MSE Undergraduate Handbook now, refer to it frequently throughout the coming semesters, and let us know how it might be changed to serve you and future students more effectively. You can also access the MSE Undergraduate Handbook online under the heading "Guides and Handbooks" at <http://www.mse.iastate.edu/students/undergraduate-major/advising-and-resources/>

Please accept our best wishes for a successful year as well as for a rewarding academic and professional career.

## II. THE DEPARTMENT OF MATERIALS SCIENCE & ENGINEERING

The MSE Department was formed in 1975 by the merger of the previously existing Departments of Ceramic Engineering and Metallurgy. MSE is one of eight degree-granting departments in the College of Engineering.

The Departmental Office is located in Room 2220 Hoover Hall. At this location you can find the Department Chair, Dr. Richard LeSar, many departmental faculty, academic advisors, and members of the MSE staff (APPENDIX F & G). These individuals are anxious to help you in any way possible and you will probably notice the need to interact with them frequently for a variety of reasons.

Several departmental bulletin boards with important student and department information are also located inside the departmental office.

### **II.A. The Materials Engineering (Mat E) Curriculum**

The MSE Department administers the undergraduate curriculum in Materials Engineering. At the undergraduate level, within this degree program, you must select a minimum of two areas of specialization from the following: ceramic, metallic, electronic, and polymeric materials. Beginning with the 2007-09 catalog you may propose your own materials-related second specialty. The specific rules for the proposal-based specialization are on page 16. You do not have to make this selection until your junior year. More detailed information about the specializations will be presented elsewhere in this booklet. (See APPENDIX B for the complete undergraduate curriculum.) Although you will of course be most concerned with your own specialization areas, it will be advantageous for you to learn as much as possible about the entire materials field. You will certainly want to try to interact with many of the students and faculty members of our Department.

You may also be interested in knowing that the MSE Department offers MS and PhD degrees in Materials Science and Engineering. You may also want to read Section III.H on the concurrent BS/MS or BS/PhD program. We invite your consideration of our excellent opportunities for graduate study at an appropriate future time.

### **II.B. The MSE Faculty**

One of the most important elements in any Department is its faculty and we have good reason to be extremely proud of ours. Its members are nationally- and internationally-known experts in their fields. Furthermore, they are adept in transmitting their knowledge and the benefits of their experiences to their students through formal and informal interactions. The names, academic backgrounds, and technical interests of the faculty are provided in APPENDIX D. You should feel completely free to contact any faculty member to discuss academic or career matters. A directory of MSE faculty is listed in APPENDIX F.

### **II.C. The Advising System**

Your academic advisor is a person with whom you will have extremely important interactions while you're at Iowa State University. You may have, by now, met your advisor and should seize every opportunity to become better acquainted with this person. The goal of the department advising system is to assist students in the development of an academic program that meets students' career objectives as well as specific curriculum requirements. The advisor interprets the rules and requirements of the university as well as the college and department, so students can make informed decisions about their programs.

Listed in APPENDIX A are the individuals who advise undergraduate students in MSE. You may find the list especially useful if you should ever need help with a problem while your own advisor is unavailable. Also included in this list are the names, office addresses, and phone numbers of the support staff who may be able to assist you. Should you ever be unable to contact your advisor directly, just inform the appropriate staff member of your need to arrange for an appointment and the message will be promptly relayed.

Please keep your advisor, as well as the department secretary, informed of any address, phone number, or other changes, as this is essential to keeping an open line of communication. Students are also able to update address information with the University very easily and quickly. This can be done by using the address change function available on the Web through AccessPlus. Especially important is that your advisor knows your e-mail address and that you check your e-mail frequently for important messages both from your advisor and from the department.

If any problem, either academic or personal, cannot be resolved by your advisor or if you cannot make contact with that person or an alternate quickly enough, the Department Chair or Associate Department Chairs will be happy to be of assistance. You are encouraged to visit with both the Chair and Associate Chair at any time, even when there are no problems.

#### **II.D. Teaching Facilities and Safety Policy**

An attractive feature of our department is the small class sizes that make instruction more interactive. In addition, our curriculum includes a large number of laboratory courses that provide hands-on education to students. Generally, the classrooms and teaching laboratories for the department are located in Hoover Hall. Our current laboratories contain all items of equipment and experimental facilities that are necessary to teach the physical concepts and illustrate the important processing operations involving materials.

Specific instructions regarding procedure and technique will be given to the enrollees of each laboratory course. Also, information will be made available concerning the specific precautions, which must be taken in the conduct of the various laboratory operations. In general, students must pursue their laboratory coursework in a safe, scientific, and professional manner.

Safety of all students, faculty, staff, and visitors is of utmost concern. The responsibility for your personal safety while engaged in the academic pursuits of the Department can never rest solely with the instructor or staff. It is your co-responsibility to become familiar with the safety provisions within the geographic confines of the Department. In general, the major hazards

encountered in lectures and/or laboratory periods include high temperatures, dangerous chemicals, and ionizing radiation. Ask your instructor for information regarding safety provisions and emergency procedures. The use and location of tongs, protective gloves, special explosion-proof storage units for flammable chemicals, chemical sinks, fume hoods, eye-wash fountains, body showers, and monitors for ionizing radiation should be discussed at the beginning of the semester. If the instructor does not include this information, then you should insist on it. In the absence of all information, the minimum approach should be that you do not attempt ANY even remotely hazardous operation when you are alone. Ask someone to be on guard. Above all, plan your work in advance and use common sense.

### **II.E. MSE Student Room Facilities**

The MSE department maintains an excellent computer and study facility for the use of MSE undergraduate students. The student room (~700 sq. ft.), located in 3337 Hoover Hall, houses PC compatibles and the software needed for MSE homework and laboratory assignments. There are also a number of peripheral devices including laser (B&W and color) printers and scanners. These computers are all networked to the college file server as well as to the Internet. There are also a number of valuable reference resources and texts.

The student room also has tables and chairs for group work. Students often find themselves meeting in the student room to work on homework and labs together. The student room is accessible 24 hours/day with a coded ID card. (See the front desk staff in 2220 Hoover to gain access.) Hoover Hall, however, is locked after hours. Building hours are currently Monday through Saturday 6 a.m. to midnight, and Sunday 7 a.m. to midnight. The computer lab is maintained by the department systems support specialist, Jeff Mentzer. Therefore, if you have questions, problems, or concerns, please contact Jeff by email at [msetech@iastate.edu](mailto:msetech@iastate.edu).

In the summer of 2012 the MSE Department is expanding its student computing and work facilities to include a “quiet” computer room in 3354 Hoover, across the hall from the main student room described above. There will also be two small student team meeting rooms in 3343 and 3345 Hoover, adjacent to the main student room. These will be available to be reserved or, if not being used under a reservation, by drop-in users.

### **II.F. Special Study and Work Opportunities**

The Department offers opportunities for undergraduates to become involved in timely and significant materials research problems. Many aspects of the Department's research activities are open to student participation via special topics courses. If you are interested, contact your advisor or the faculty member with whom you would like to work.

Another quite fruitful source of information on materials research and the current activities of materials scientists is the departmental seminar series. Presentations are offered by off-campus speakers as well as by staff members and graduate students from MSE and other ISU departments. Although the series is of primary interest to persons involved in research, you are most welcome and will often find the subject pertinent to your course work or expected

professional involvement. Announcements of the seminars are posted on fliers that are put on various bulletin boards throughout the Department; they are also sent via email.

There are a significant number of opportunities for undergraduate students in MSE to secure part-time employment as research or teaching assistants. If you wish to be considered for these, you should make your interests known to your academic advisor.

### **II.G. Co-Op/Internships**

Industrial positions as co-op students (3 work terms alternating with class) and internships (either semester or summer) are often available to students and provide valuable experience. If you are interested in these programs, see the co-op/internship advisors listed in APPENDIX A.

### **II.H. International Exchange Programs**

The MSE department currently has an agreement with the Materials Engineering Department at Brunel University (United Kingdom) to develop a program of academic exchange for faculty and students. There is also a summer program, usually taken after the first year, at Brunel that includes a 3 credit U.S. Diversity course and a 3 credit introductory materials course (Mat E 391 and Mat E 392). Mat E 215L (1 credit) in the following fall will complete the substitution requirements for Mat E 215/215L. In addition, the International Perspectives requirement will be met through completion of the study abroad experience. If you are interested in this program, please contact either your academic advisor or Professor Scott Chumbley (Program Coordinator, [chumbley@iastate.edu](mailto:chumbley@iastate.edu)). The deadline to express interest in this program is by Thanksgiving Break in your first year.

There are also a number of opportunities to study abroad in exchange programs that are available to all College of Engineering students. Some of the countries where our students have studied include Australia, Ireland, Singapore, Switzerland, Turkey, and Wales to name a few. For more information, you may contact your academic advisor or the Engineering International Engagement Office located in 112 Marston (<http://www.engineering.iastate.edu/studyabroad/>, 515-294-9295, [eip@iastate.edu](mailto:eip@iastate.edu)).

### III. ACADEMIC MATTERS

The MSE Department offers an undergraduate curriculum in Materials Engineering. This area of study leads to the Bachelor of Science degree. There is significant flexibility in the program allowing you to shape it to your own needs and goals.

The four year plan outlined in Appendix B provides a general template for planning. To create your own individual plan, please consult your academic advisor.

The next several paragraphs present in some detail areas that directly affect you and your progress toward the BS degree.

#### **III.A. Academic Progress**

Each semester brings a set of deadlines for completing a number of essential activities. You are urged to be alert to possible changes in the schedule and to announcements containing additional information of this type as the academic year progresses. These elements of new information will be conveyed by means of notices placed on a bulletin board in the main office in Hoover Hall, postings in the computer lab, and sometimes in e-mails from your advisor or administrative staff. One of the best references is the Academic Calendar page on the Iowa State University web site: <http://www.registrar.iastate.edu/calendar/>.

As you might expect, the University goes to great lengths to keep track of your academic progress. At the end of each semester a grade report slip will be posted on your record and you can view it using Access Plus. On it are noted the courses for which you were registered, as well as the grades you achieved.

Your academic progress is also reflected on a degree audit, available to you at any time through a link on Access Plus. It is essential that you work with your advisor to keep this form as accurate as possible, as it will ultimately be used to determine your eligibility for graduation.

#### **III.B. Program Objectives and Outcomes**

The Materials Engineering Curriculum has been designed to provide you with experiences to develop the knowledge and skills required to serve the profession. The program objectives are shown below:

##### **Educational Objectives**

Within the scope of the MSE mission the objectives of the Materials Engineering Program are to produce graduates who:

- a. practice materials engineering in a broad range of industries including materials production, semiconductors, medical/environmental, consumer products, and transportation products
- b. respond to environmental, social, political, ethical and economic constraints to improve the quality of life in Iowa and the world
- c. work independently and in teams and are proficient in written, oral, and graphical communication
- d. engage in lifelong learning in response to the rapidly expanding knowledge base and changing environment of our world, and
- e. engage in advanced study in materials and related or complementary fields.

### **Educational Outcomes**

Engineering programs must demonstrate that their graduates have:

- a. an ability to apply knowledge of mathematics, science, and engineering
- b. an ability to design and conduct experiments, as well as to analyze and interpret data
- c. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- d. an ability to function on multi-disciplinary teams
- e. an ability to identify, formulate, and solve engineering problems
- f. an understanding of professional and ethical responsibility
- g. an ability to communicate effectively
- h. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- i. a recognition of the need for and an ability to engage in life-long learning
- j. a knowledge of contemporary issues, and
- k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

### **Additional Materials-Specific Outcomes**

Graduates of the program must have demonstrated:

- l. an ability to apply advanced science (such as chemistry and physics) and engineering principles to materials systems
- m. an integrated understanding of the scientific and engineering principles underlying the four major elements of the field (structure, properties, processing, & performance)
- n. an ability to apply and integrate knowledge from each of the above four elements of the field to solve materials selection and design problems, and
- o. an ability to utilize experimental, statistical and computational methods consistent with the goals of the program.

### **Additional Materials-Specific Outcomes specified for ISU/MSE**

Graduates have...

- p. demonstrated mastery of creative, independent, problem solving skills, under time and resource constraints, in a broad range of materials-related applications critical to the success of the final product.

- q. gained experience in materials engineering practice through co-ops or internships in industry, national laboratories, or other funded research work.
- r. demonstrated hands-on skills with a broad range of modern materials processing and characterization equipment and methods, with special in-depth concentration in two student-selected areas from among ceramic, electronic, metallic, and polymeric materials.

### **III.C. Choosing Areas of Specialization**

You must choose your two areas of specialization from the following: ceramic, electronic, polymeric, metallic materials or a materials-related specialty that you can propose for approval (see page 16). You may also choose to use your technical electives to pursue a third area. If you choose to invest more time in your education, you could potentially choose to take courses in all four specializations. The choice of specializations can be made any time prior to your first semester of junior year. The materials courses you will take during your sophomore year will expose you to all areas of materials, providing information on which to base your decision. Please inform your advisor as soon as you have chosen your areas of specialization. You may change at any time, but be aware that if you change AFTER you begin your specialization sequence, your graduation date may be delayed as a result. Many students choose to take entry level courses for three areas with the intent of using the “extra” course as a technical elective. This strategy allows you to delve deeper into the topic before making a decision.

### **III.D. Requirements for Graduation**

In order to earn a B.S. in Materials Engineering, you must earn a **minimum average GPA of 2.0** in the following core courses:

Mat E 215/215L/216	Mat E 316	Mat E 418
Mat E 214	Mat E 317	
Mat E 311	Mat E 413	
Mat E 314	Mat E 414	
* <u>Plus</u> your six specialization courses (three courses from each of your two official areas of specialization).		

The use of a 490 course from any department (Mat E 490 included) to substitute for a required Mat E course is highly discouraged and is only allowed with prior approval by the MSE Undergraduate Curriculum Committee. Such approval will require the student to submit a proposal to the committee, in advance, explaining why it is impossible to take the required course itself and how the proposed 490 will be assured (by the student and the instructor) to be equivalent to the Mat E course for which it is being substituted.

### **III.E. English Proficiency Requirement**

The Department of Materials Science and Engineering requires a grade of C or better in Engl 150 and 250 and one of the following courses: Engl 302, 309, 314, JLMC 347.

### **III.F. Departmentally Approved Electives**

This program requires 15 credits of General Education electives (see section E.2) and 3 credits of free electives (see section E.3). The University requires 3 credits of these come from an approved list for U.S. Diversity course work and 3 credits come from an approved list for International Perspectives course work (APPENDIX C). Additionally, students must have a six-credit area of emphasis within their Gen Ed courses. An approved study or work abroad program of sufficient length will substitute for the International Perspectives requirement allowing these 3 credits to be taken elsewhere.

This program also requires nine credits of Technical Electives (see Appendix C.1).

### **III.G. Pass/ Not Pass Grading**

Students may take up to 9 semester credit hours of General Education or free electives on a pass-not pass basis meaning that only a S (satisfactory or pass) or F (fail or not pass) will be recorded as their final grade in the course. However, those courses meeting U.S. Diversity and International Perspectives requirements or the technical writing requirement may NOT be taken P/NP. The purpose of P/NP grading is to encourage students to take more challenging courses than their usual program of study requires. You must have earned at least 40 semester credits prior to being eligible to take a course P/NP and may not be on academic probation. Only General Education elective or free elective courses may be taken P/NP. Students should discuss this option with their advisor.

The free elective credits can be any non-remedial University course you choose. [Examples of remedial classes include Chem 105, Math 140, Math 141, Math 142, and English 101].

### **III.H. Scholarships**

The Department maintains an outstanding scholarship program for its undergraduate students. Also, many general scholarships open to students in all disciplines of the College of Engineering are available to students in our department. In recent years, MSE students have received scholarships ranging from \$250-\$8500.

To apply for any of the scholarships offered by the Department or the College a student **MUST** complete the College of Engineering Scholarship application, which is available online (<http://www.engineering.iastate.edu/student-services/scholarships/>). **The deadline to submit scholarship applications is around February 1<sup>st</sup> each year.** Email notifications will be sent out concerning the application deadline. Selection recommendations for all scholarships are prepared by departmental and college committees. Scholarship recipients are named and honored at the annual MSE Awards Banquet.

### **III.I. Concurrent BS/Graduate Study Program Application Guidelines**

#### ***Overview***

The following information provides details of the MSE Department's concurrent BS/Graduate Study program and requirements. This information is also available on the MSE website at <http://www.mse.iastate.edu/students/concurrent/>.

The Department of Materials Science and Engineering can admit seniors with exceptional academic qualifications into the program for "Concurrent Enrollment for Graduate/Undergraduate Degrees." A student in this program pursues a graduate MS or PhD degree while simultaneously completing his/her undergraduate BS degree. After successfully completing the requirements for the BS and graduate degree, the student will receive both degrees at graduation – typically, but not always, on the same graduation date.

Students seeking admission to this program will apply near the end of their junior year of undergraduate education or within one year before the expected semester of BS graduation. However, please note that application deadlines are the same as those listed on the MSE Graduate Program/Application Requirements page: <http://www.grad-college.iastate.edu/academics/programs/apprograms.php>. Students are encouraged to discuss the matter with their academic advisor, potential major professor, Director of Graduate Education (DOGE), or MSE Department Chair. An information packet is also available from the MSE Graduate Coordinator or MSE Undergraduate Academic Advisors in the main MSE Office, 2220 Hoover Hall.

#### ***Qualifications:***

Minimum overall GPA of 3.5

Minimum 90 credits completed to begin BS/Graduate Study Program

Major Professor must be identified

#### **In brief summary, the following steps should be taken to apply for the Concurrent BS/Graduate program:**

Please obtain items 3 and 5 from the MSE graduate coordinator.

Items 4, 6, and 7 are available on-line at <http://www.grad-college.iastate.edu/common/forms/index.php>

1. Identify an MSE faculty member willing to serve as your Major Professor. (see item 3)
2. Obtain a written recommendation from your undergraduate academic advisor. (see item 3)
3. Complete an *MSE Concurrent Enrollment Approval* form (requires academic advisor and Major Professor signatures)
4. Complete an *Application for an ISU Undergraduate Student Wishing to Pursue a Concurrent Degree* form that also must include the following items - Full Resume/Curriculum Vitae, GRE General Test Scores\*, three letters of recommendation, personal statement of purpose and research interests. (\*recommended, but not required of current ISU undergraduate students)

5. Complete MSE Concurrent Proposed Graduate Plan (CPGP) – used solely as a tool for the student and major professor and/or academic advisor in preparation for the students' graduate program of study.

Forms to complete once graduate admission is approved:

6. Recommendation for Committee Appointment form
7. Program of Study (POS) form

**Great Reference Tool/Website:**

Graduate College Handbook

<http://www.grad-college.iastate.edu/common/handbook/>

***Admission/Assistantship***

No decision will be made on admission until all application material is complete and submitted. Concurrent students are under the same guidelines for review as all other students who apply through the graduate application process.

Students in the Concurrent BS/Graduate program are eligible for research assistantships offered directly through MSE faculty members with research contracts (this would be the major professor that you have identified in your application); however, such assistantships are contingent upon availability of funding and are not guaranteed for all concurrent BS/Graduate students. Students are eligible for a ¼-time assistantship upon entrance into the BS/Graduate program. Students who have accrued enough applicable credits to be eligible for B.S. graduation are eligible for a ½-time assistantship. However, this is not automatic – written documentation via the signed *MSE Concurrent Enrollment Assistantship Increase Form* is required. Once received and approved, appropriate action will be taken to apply the increase. In addition, all students on assistantship are eligible for in-state resident tuition.

***Please Note:*** It is important that prior to application/enrollment in the concurrent program you seriously consider how the financial aspects of this appointment may affect you individually. Each person's situation is different. It may be worthwhile to visit with a financial aid advisor prior to making any final decisions about the concurrent program as scholarships, grants, etc. could be affected by your appointment as you will no longer be in undergraduate status, but graduate status once you are accepted into the concurrent program.

***Coursework***

Students may double-count up to six credits between their B.S. and graduate degree requirements. However, courses may be used in this manner only when they are taken after the date the student becomes a concurrent BS/Graduate student.

### **III.J. Student Organizations**

We are fortunate to have several very active student organizations in which our students in MSE can participate. (See APPENDIX G.) Student professional societies and clubs for Materials Engineers include the following:

Material Advantage (program of the combined ACerS, ASM, TMS)  
Keramos – National Professional Ceramic Engineering Fraternity  
Gaffer's Guild – Glass Blowing Club

Material Advantage is a membership option for students who want to get more out of their materials engineering experience. It provides access to the materials science and engineering profession's most outstanding societies: American Society of Materials (ASM), The Materials Society (TMS), and the American Ceramic Society (ACerS). Our chapter of Material Advantage is a joint chapter of all three. The organization's national web site can be visited at <http://materialadvantage.org/>. Our chapter was named most outstanding chapter in the nation for the last eight years.

Keramos is a National Professional Ceramic Engineering Fraternity. One of the main functions of Keramos is to promote and emphasize scholarship and character in the thoughts of students in Ceramics and to promote interest in the professional aspects of ceramic engineering, technology, and science. ISU's chapter strives to recognize students with outstanding academic achievement and encourage interaction between students and alumni. Students are selected to become a member of this honorary organization. More information can be obtained through the ACerS national web site at <http://ceramics.org/member-services/classes>.

Gaffer's Guild is the artistic glass blowing club at Iowa State University. The club is a unique organization -- membership is open to all students and members of the community. They provide educational sessions where you can learn to blow glass. There are specific guidelines for becoming a gaffer. For more information visit their web site: <http://gaffer.stuorg.iastate.edu/>.

You probably have been, or soon will be, contacted by a person from one or more of these organizations. That person would be very pleased to discuss the activities and membership procedures with you. If you have not been so contacted, please do not hesitate to get in touch with the organizational representatives and let your interests be known. The names of the current officers and faculty advisors for these groups are listed in APPENDIX G.

Benefits of being involved in these organizations include: the chance to become better acquainted with other students and the staff members in the department, some very excellent insight regarding the nature of your field, an early and continuing exposure to the practical and applied aspects of the materials disciplines through field trips and attendance at national or regional meetings, and finally, beneficial contact with practicing engineers. These organizations also provide their members with effective mechanisms for interacting with departmental operations and administration. The comparatively minor amount of time and effort that any of these organizations require will be very well spent and each one of you is encouraged to consider becoming actively involved.

### **III.K. Interviewing and Placement**

Although the specific timetable adopted varies with each individual's situation, it is generally true that during the senior year, students will arrange campus and on-site interviews with potential employers. It is advisable to be registered with the Engineering Career Services Office as early as your freshman year as co-op, internship, and summer opportunities often exist. Also, the Career Services staff is willing to provide assistance and guidance whenever it is needed. The Engineering Career Services web site (<http://www.engineering.iastate.edu/ecs/>) is also a good source for information.

Information regarding the schedule of campus interview visits that are planned by industrial representatives and descriptions of specific openings are available on-line at the Engineering Career Services web site. In addition to these placement announcements, job opportunities are also posted on the departmental bulletin board just outside the student computer room.

## **IV. CONCLUSION**

We hope that the information presented in this MSE Handbook has helped to answer some of your questions. At the very least, we hope that this information has pointed you in the right direction. We invite your constructive criticism for future editions.

Once more, we wish you every success in all of your activities while you are at Iowa State University and after you depart. We stand ready to help you achieve success in any way we possibly can.

APPENDIX A

UNDERGRADUATE ACADEMIC ADVISORS

NAME	OFFICE	PHONE	EMAIL
Shannon Grundmeier	2220R Hoover	294-5927	shannong@iastate.edu
Andrea Klocke	2220B Hoover	294-0891	aklocke@iastate.edu

HONORS PROGRAM CONTACT

NAME	OFFICE	PHONE	EMAIL
Dr. Scott Chumbley	2220Q Hoover	294-1435	chumbley@iastate.edu

UNDERGRADUATE CURRICULUM CHAIR

NAME	OFFICE	PHONE	EMAIL
Dr. Larry Genalo	2220A Hoover	294-4722	genalo@iastate.edu

UNDERGRADUATE SUPPORT STAFF

NAME	OFFICE	PHONE	EMAIL
Melissa Skinner	2220 Hoover	294-1243	skinnerm@iastate.edu

APPENDIX B.1

**Curriculum in Materials Engineering  
2012-2013 Catalog**

Total credits required: 128

Freshman Year					
<i>Semester 1</i>	16 cr	Year taken	<i>Semester 2</i>	17 cr	Year taken
Math 165	4 cr		Math 166	4 cr	
Engr 160	3 cr		Chem 178	3 cr	
Engr 101	R cr		Chem 178L	1 cr	
English 150	3 cr		Gen Ed: _____	3 cr	
Chem 177	4 cr		Gen Ed: _____	3 cr	
Chem 177L	1 cr		Gen Ed: _____	3 cr	
Lib 160	1 cr		(U.S. Diversity)		
<i>NOTE: You must have a 6 cr area-of-emphasis in Gen Eds.</i>					
Sophomore Year					
<i>Semester 3</i>	16 cr	Year taken	<i>Semester 4</i>	16 cr	Year taken
Math 265	4 cr		Math 267	4 cr	
Mat E 201	R cr		Mat E 214	3 cr	
Mat E 215	3 cr		Mat E 216	4 cr	
Mat E 215L	1 cr		Phys 222	5 cr	
Phys 221	5 cr				
English 250	3 cr				
Junior Year					
<i>Semester 5</i>	15 cr	Year taken	<i>Semester 6</i>	18 cr	Year taken
Mat E 311	3 cr		Mat E 314	3 cr	
Mat E 317	3 cr		Mat E 316	3 cr	
Spec. I: _____	3 cr		Spec. I: _____	3 cr	
EM 274	3 cr		Spec. II: _____	3 cr	
Gen Ed: _____	3 cr		EM 324	3 cr	
(International Perspectives)			Tech. elec.: _____	3 cr.	
Senior Year					
<i>Semester 7</i>	15 cr	Year taken	<i>Semester 8</i>	15 cr	Year taken
Mat E 413	3 cr		Mat E 414	3 cr	
Spec. I: _____	3 cr		Mat E 418	3 cr	
Spec. II: _____	3 cr		Spec. II: _____	3 cr	
Tech. elec.: _____	3 cr		Tech. elec.: _____	3 cr	
Free elec.: _____	3 cr		Gen Ed*: _____	3 cr	
			(Technical Writing)		

**Specialization Course Sequences**

(Note: F = offered Fall only, S = offered S only, F or S = offered Fall or Spring)

<u>Ceramics</u>	<u>Electronics</u>	<u>Metals</u>	<u>Polymers</u>
Mat E 321 (F)	Mat E 334 (S)	Mat E 342 (S)	Mat E 351 (F)
Mat E 322 (S)	Mat E 433 (F)	Mat E 443 (F)	Mat E 453 (F)
Mat E 425 (F)	Mat E 332 (F or S)	Mat E 444 (S)	Mat E 454 (S)

\*Included in the 15 total Gen Ed credits is a **3 credit technical writing requirement.**

Choose one of the following courses: Engl 314, Engl 302, Engl 309, or JL MC 347.

APPENDIX B.1

**Curriculum in Materials Engineering  
2011-2012 Catalog**

Total credits required: 127.5

Freshman Year					
<i>Semester 1</i>	15.5 cr	Year taken	<i>Semester 2</i>	17 cr	Year taken
Math 165	4 cr		Math 166	4 cr	
Engr 160	3 cr		Chem 178	3 cr	
Engr 101	R cr		Chem 178L	1 cr	
English 150	3 cr		Gen Ed: _____	3 cr	
Chem 177	4 cr		Gen Ed: _____	3 cr	
Chem 177L	1 cr		Gen Ed: _____	3 cr	
Lib 160	0.5 cr		(U.S. Diversity)		
<b>NOTE: You must have a 6 cr area-of-emphasis in Gen Eds.</b>					
Sophomore Year					
<i>Semester 3</i>	16 cr	Year taken	<i>Semester 4</i>	16 cr	Year taken
Math 265	4 cr		Math 267	4 cr	
Mat E 201	R cr		Mat E 214	3 cr	
Mat E 215	3 cr		Mat E 216	4 cr	
Mat E 215L	1 cr		Phys 222	5 cr	
Phys 221	5 cr				
English 250	3 cr				
Junior Year					
<i>Semester 5</i>	15 cr	Year taken	<i>Semester 6</i>	18 cr	Year taken
Mat E 311	3 cr		Mat E 314	3 cr	
Mat E 317	3 cr		Mat E 316	3 cr	
Spec. I: _____	3 cr		Spec. I: _____	3 cr	
Spec. II: _____	3 cr		EM 324	3 cr	
EM 274	3 cr		Tech. elec.: _____	3 cr.	
			Gen Ed: _____	3 cr	
(International Perspectives)					
Senior Year					
<i>Semester 7</i>	15 cr	Year taken	<i>Semester 8</i>	15 cr	Year taken
Mat E 413	3 cr		Mat E 414	3 cr	
Spec. I: _____	3 cr		Mat E 418	3 cr	
Spec. II: _____	3 cr		Spec. II: _____	3 cr	
Tech. elec.: _____	3 cr		Tech. elec.: _____	3 cr	
Free elec.: _____	3 cr		Gen Ed*: _____	3 cr	
(Technical Writing)					

**Specialization Course Sequences**

(Note: F = offered Fall only, S = offered S only, F or S = offered Fall or Spring)

<u>Ceramics</u>	<u>Electronics</u>	<u>Metals</u>	<u>Polymers</u>
Mat E 321 (F)	Mat E 334 (S)	Mat E 342 (S)	Mat E 351 (F)
Mat E 322 (S)	Mat E 433 (F)	Mat E 443 (F)	Mat E 453 (F)
Mat E 425 (F)	Mat E 332 (S)	Mat E 444 (S)	Mat E 454 (S)

\*Included in the 15 total Gen Ed credits is a **3 credit technical writing requirement.**

Choose one of the following courses: Engl 314, Engl 302, Engl 309, or JL MC 347.

APPENDIX B.1

**Curriculum in Materials Engineering  
2009-2011 Catalog**

Total credits required: 127.5

Freshman Year					
<i>Semester 1</i>	15.5 cr	Year taken	<i>Semester 2</i>	17 cr	Year taken
Math 165	4 cr		Math 166	4 cr	
Engr 160	3 cr		Engr 170 (Sub: _____)	3 cr	
Engr 101	R cr		Chem 178	3 cr	
English 150	3 cr		Chem 178L	1 cr	
Chem 177	4 cr		Gen Ed: _____	3 cr	
Chem 177L	1 cr		Gen Ed: _____	3 cr	
Lib 160	0.5 cr				
<i>NOTE: You must have a 6 cr area-of-emphasis in Gen Eds.</i>					
Sophomore Year					
<i>Semester 3</i>	16 cr	Year taken	<i>Semester 4</i>	16 cr	Year taken
Math 265	4 cr		Math 267	4 cr	
Mat E 201	R cr		Mat E 214	3 cr	
Mat E 215	3 cr		Mat E 216	4 cr	
Mat E 215L	1 cr		Phys 222	5 cr	
Phys 221	5 cr				
English 250	3 cr				
Junior Year					
<i>Semester 5</i>	18 cr	Year taken	<i>Semester 6</i>	15 cr	Year taken
Mat E 311	3 cr		Mat E 314	3 cr	
Mat E 317	3 cr		Mat E 316	3 cr	
Spec. I: _____	3 cr		Spec. I: _____	3 cr	
Spec. II: _____	3 cr		EM 324	3 cr	
EM 274	3 cr		Gen Ed: _____	3 cr	
Gen Ed: _____	3 cr		(International Perspectives)		
(U.S. Diversity)					
Senior Year					
<i>Semester 7</i>	15 cr	Year taken	<i>Semester 8</i>	15 cr	Year taken
Mat E 413	3 cr		Mat E 414	3 cr	
Spec. I: _____	3 cr		Mat E 418	3 cr	
Spec. II: _____	3 cr		Spec. II: _____	3 cr	
Tech. elec.: _____	3 cr		Tech. elec.: _____	3 cr	
Free elec.: _____	3 cr		Gen Ed*: _____	3 cr	
			(Technical Writing)		

**Specialization Course Sequences**

(Note: F = offered Fall only, S = offered S only, F or S = offered Fall or Spring)

<u>Ceramics</u>	<u>Electronics</u>	<u>Metals</u>	<u>Polymers</u>
Mat E 321 (F)	Mat E 334 (S)	Mat E 342 (S)	Mat E 351 (F)
Mat E 322 (S)	Mat E 433 (F)	Mat E 443 (F)	Mat E 453 (F)
Mat E 425 (F)	Mat E 332 (S)	Mat E 444 (S)	Mat E 454 (S)

\*Included in the 15 total Gen Ed credits is a **3 credit technical writing requirement.**

Choose one of the following courses: Engl 314, Engl 302, Engl 309, or JL MC 347.

APPENDIX B.2

Curriculum in Materials Engineering

2007-2009 Catalog

Total credits required: 127.5

Freshman Year					
Semester 1	15.5 cr	Year taken	Semester 2	17 cr	Year taken
Math 165	4 cr		Math 166	4 cr	
Engr 160	3 cr		Engr 170	3 cr	
Engr 101	R cr		Chem 178	3 cr	
English 150	3 cr		Chem 178L	1 cr	
Chem 177	4 cr		Gen Ed: _____	3 cr	
Chem 177L	1 cr		Gen Ed: _____	3 cr	
Lib 160	0.5 cr				
<i>NOTE: You must have a 6 cr area-of-emphasis in Gen Eds.</i>					
Sophomore Year					
Semester 3	17 cr	Year taken	Semester 4	18 cr	Year taken
Math 265	4 cr		Math 267	4 cr	
Mat E 201	R cr		Mat E 214	3 cr	
Mat E 211	5 cr		Phys 222	5 cr	
Phys 221	5 cr		EM 274	3 cr	
Gen Ed: _____	3 cr		English 250	3 cr	
	<i>(U.S. Diversity)</i>				
Junior Year					
Semester 5	15 cr	Year taken	Semester 6	15 cr	Year taken
Mat E 311	3 cr		Mat E 314	3 cr	
Spec. I: _____	3 cr		Mat E 316	3 cr	
Spec. II: _____	3 cr		Spec. I: _____	3 cr	
EM 324	3 cr		Spec. II: _____	3 cr	
Gen Ed: _____	3 cr		Gen Ed*: _____	3 cr	
	<i>(International Perspectives)</i>			<i>(Technical Writing)</i>	
Senior Year					
Semester 7	15 cr	Year taken	Semester 8	15 cr	Year taken
Mat E 413	3 cr		Mat E 414	3 cr	
Spec. I: _____	3 cr		Mat E 418	3 cr	
Spec. II: _____	3 cr		Spec. I: _____	3 cr	
Tech. elec.: _____	3 cr		Spec. II: _____	3 cr	
Free elec.: _____	3 cr		Tech. elec.: _____	3 cr	

Specialization Course Sequences

(note: with few exceptions, courses are listed as they are offered: Fall only, Spring only, Fall only, Spring only)

<u>Ceramics</u>	<u>Electronics</u>	<u>Metals</u>	<u>Polymers</u>
Mat E 321	Mat E 331/331L (4 cr)	Mat E 341	Mat E 351
Mat E 322	Mat E 332/EE 332	Mat E 342	Mat E 442/ChE 442
Mat E 423	Mat E 433	Mat E 443	Mat E 454
Mat E 424	Mat E 432/EE 432 (4 cr)	Mat E 444	Mat E 453

\*Included in the 15 total Gen Ed credits is a 3 credit technical writing requirement.

Choose one of the following courses: Engl 314, Engl 302, Engl 309, or JL MC 347.

## APPENDIX B.2

### Proposal Based Specialization

A student may choose to replace one of the 3-course specializations with a proposal-based specialization (PBS) of their own design. The student must apply for acceptance into the PBS program by creating a “course of study” justifying the choice of each course as well as a statement concerning the overall purpose of the proposed specialization. This proposal should be submitted to the curriculum committee with a completed approval form early in the semester after the academic requirements for acceptance are met; usually during the second semester of the student’s sophomore year. The proposal will be evaluated by the curriculum committee with the aid of faculty familiar to the proposed specialization.

#### Limitations:

1. The proposed course substitutions should be technical or semi-technical in nature; coming from any engineering, physical or life science department. There are cases where the committee will consider non- or semi-technical based proposals (see below for requirements).  
Example: “Materials and Art Restoration” or “Environmentally Friendly Materials”
2. This program is meant to add flexibility to materials science, not act as an alternative to a minor. If a minor is available from ISU for the proposed study, the application will be rejected.

#### Requirements for Acceptance:

1. A minimum cumulative GPA of 3.0 is required (3.3 is *recommended*) at the time of application to the program.
  - a. This must be based on at least 45 credits, 30 which must be ISU credits
  - b. Must include: Engr 160, Math 165, 166, 265, 267, Mat E 215, 215L, Phys 221, Chem 177, 177L, 178, 178L (or equivalents)
  - c. A grade of B+ or better must have been earned in Mat E 215, 215L
2. A completed approval form, which includes permissions from the student’s Mat E 215/215L instructors, academic advisor, and at least one other faculty member.
3. The proposal must include a complete proposed “program of study” for all remaining semesters.

#### Proposal Requirements:

1. Clearly state the overall intent of the proposed specialization. Reference materials are recommended.
2. Proposal must specify a **minimum** of 3 courses **and** 9 credits and justification for the selection of each course.
  - a. Two courses (6 cr) must be at the 300+ level.
  - b. One course (3 cr) must be at the 400+ level.
  - c. At least two courses must come from any engineering department, physics, chemistry, math or the life sciences.
  - d. Courses *may* be selected from other departments if the arguments for selection are compelling, in the opinion of the committee.
  - e. The use of 490’s is discouraged. If a 490 is proposed a justification for the course and details about the course must be specified.
3. The proposal must meet a standard of “academic merit” and “reasonable intention” in the opinion of the committee.
4. The committee may choose to interview the candidate to assess the merit of the proposal.

#### Other Restrictions:

1. Any subsequent changes in the proposed specialization must be pre-approved by the curriculum committee.
2. PBS may not be used to “avoid” a class in one of the four current specializations.

## TECHNICAL ELECTIVES

### **Guidelines for Technical Electives in Materials Science and Engineering:**

Materials Science is a diverse field and there are many options for appropriate technical electives. Most fall within the following categories, though if you find an elective that you feel is appropriate, but is not on this list, please consult with your advisor.

1. Any 300 or 400 level Math, Physical or Life Sciences, or Engineering course not in Materials Engineering.
2. Any graduate level course in Math, Physical or Life Sciences, or Engineering, including Materials Science and Engineering.
3. Any 300 or 400 level Materials Engineering course not required for your Mat E degree. (Exception: students may not use Mat E 490 toward this requirement unless prior approval is granted by the MSE Undergraduate Curriculum Committee)
4. A 490 course in any department is not allowed unless prior approval is granted by the MSE Undergraduate Curriculum committee.

## FREE ELECTIVES ACCEPTABLE FOR MATERIALS ENGINEERING CURRICULA

Materials Engineering students are required to take 3 credits of “free” electives. A free elective can be any non-remedial course. (For example, Mat E students take Math 165 as the first required math course. Any lower math course is considered remedial and therefore cannot be applied towards the free elective requirement.)

The following is a partial list of courses that would be considered remedial: any course at a level lower than 100 and courses such as:

Math 104	Chem 155	Phys 106
Math 105	Chem 160	Phys 111
Math 140	Chem 163	Phys 112
Math 141	Chem 164	Stat 1XX
Math 142	Phys 101	Com S 103

**GENERAL EDUCATION (GEN ED) ELECTIVES ACCEPTABLE  
FOR MATERIALS ENGINEERING CURRICULA**

Materials engineering students are encouraged to select Gen Ed courses that broaden their academic program. Courses in the social sciences (sociology, anthropology, journalism and mass communication, economics, political science, human development and family studies, psychology) or humanities (architecture, literature, foreign language, music, philosophy, religion, history) are especially encouraged. Please see listing on next page.

All materials engineering majors must take 15 credits of Gen Ed courses. Within the 15 credits, students must have a **6-credit area of emphasis**. The courses used to create the area of emphasis do not have to be in the same department (e.g. Phil 235 Ethical Issues in a Diverse Society and Mgmt 472 Management of Diversity). The university requirements for U.S. Diversity and International Perspectives must be met, and can be met through the courses selected in the Gen Ed requirement.

Any university course may be selected for Gen Ed requirements except:

1. The course may not be remedial.
2. The course may not be offered in engineering, physics, chemistry, computer science, or mathematics.
3. The course may not be one that could have counted as a technical elective (e.g. a 300 level life science may not be used for Gen Ed, but a 200 level can be used).
4. No more than 9 credits in 100-level courses
5. No more than 9 credits may be taken from any one department
6. No “skills” courses (such as Kinesiology classes in golf, pool, etc. or music courses in playing an instrument or participating in band, choir, etc.)

APPENDIX C.2

Social Sciences and Humanities/General Education Courses

Accepted by Engineering

2012-2013 Catalog

<p><u>African American Studies (AF AM)</u> 201<sup>1</sup>, 330<sup>1</sup>, 347<sup>1</sup>, 348<sup>1</sup>, 350<sup>1</sup>, 353<sup>1</sup>, 354<sup>1</sup></p> <p><u>American Indian Studies (AM IN)</u> 210<sup>1</sup>, 322<sup>1</sup>, 323<sup>2</sup>, 328<sup>1</sup>, 342<sup>1</sup>, 346<sup>1</sup></p> <p><u>Anthropology (ANTHR)</u> 201<sup>2</sup>, 306<sup>2</sup>, 309<sup>2</sup>, 313<sup>2</sup>, 322<sup>1</sup>, 323<sup>2</sup>, 340<sup>2</sup>, 411<sup>2</sup>, 444<sup>2</sup></p> <p><u>Architecture (ARCH)</u> 221<sup>2</sup>, 222<sup>2</sup>, 420<sup>1</sup>, 422<sup>2</sup>, 423<sup>2</sup>, 424, 425, 426<sup>1</sup>, 427<sup>2</sup></p> <p><u>Art History (ART H)</u> 280<sup>2</sup>, 281<sup>2</sup>, 382<sup>2</sup>, 383, 385, 394<sup>1</sup>, 481<sup>2</sup>, 495<sup>1</sup></p> <p><u>Biology (BIO)</u> 307<sup>1</sup></p> <p><u>Classical Studies (CL ST)</u> 273<sup>2</sup>, 275<sup>2</sup>, 353<sup>2</sup>, 372<sup>2</sup>, 373<sup>2</sup>, 374<sup>2</sup>, 376<sup>2</sup>, 394<sup>2</sup></p> <p><u>Community and Regional Planning (C R P)</u> 253, 270<sup>1</sup>, 291<sup>2</sup></p> <p><u>Economics (ECON)</u> 101, 102, 301, 302, 312, 320, 321<sup>1</sup>, 355<sup>2</sup>, 370<sup>2</sup>, 380, 385<sup>2</sup></p> <p><u>English (ENGL)</u> 201, 237, 240<sup>1</sup>, 330, 335, 340<sup>1</sup>, 344<sup>1</sup>, 345<sup>1</sup>, 346<sup>1</sup>, 347<sup>1</sup>, 348<sup>1</sup>, 349<sup>1</sup>, 353<sup>2</sup>, 354<sup>2</sup>, 364, 370<sup>2</sup>, 373, 374<sup>2</sup>, 375<sup>2</sup>, 376<sup>2</sup>, 378, 389<sup>2</sup>, 420, 422<sup>1</sup></p> <p><u>Environmental Studies (ENV S)</u> 342<sup>2</sup>, 345<sup>2</sup>, 382, 484</p> <p><u>History (HIST)</u> All except 490, 495 (i.e. 201<sup>2</sup>, 202<sup>2</sup>, 207<sup>2</sup>, 221, 222, 280<sup>2</sup>, 281<sup>2</sup>, 323<sup>2</sup>, 336<sup>2</sup>, 337<sup>2</sup>, 341<sup>2</sup>, 389<sup>2</sup>, 390<sup>2</sup>, 421<sup>2</sup>, 422<sup>2</sup>, 473<sup>1</sup>)</p> <p><u>Human Development and Family Studies (HD FS)</u> 239<sup>1</sup>, 240<sup>1</sup>, 276<sup>1</sup>, 377<sup>1</sup></p>	<p><u>Journalism and Communication (JL MC)</u> 461, 464, 474<sup>2</sup>, 476<sup>2</sup>, 477<sup>1</sup></p> <p><u>Liberal Arts and Sciences</u> 211<sup>1</sup>, 325<sup>1</sup>, 385<sup>2</sup></p> <p><u>Music (MUSIC)</u> 102<sup>2</sup>, 383<sup>2</sup>, 384<sup>2</sup>, 471<sup>2</sup>, 472<sup>1</sup></p> <p><u>Philosophy (PHIL)</u> All except 206, 207, 490, 492 (i.e. 201, 235<sup>1</sup>, 338<sup>1</sup>)</p> <p><u>Political Science (POL S)</u> All except 101, 298, 301, 417, 430, 475, 476, 490-499 (i.e. 215, 241<sup>2</sup>, 251<sup>2</sup>, 341<sup>2</sup>, 349<sup>2</sup>, 350<sup>2</sup>, 385<sup>1</sup>, 452<sup>2</sup>)</p> <p><u>Psychology (PSYCH)</u> 101, 230, 280, 314, 346<sup>1</sup>, 381</p> <p><u>Religious Studies (RELIG)</u> All except 340, 490, 491, 499 (i.e. 205<sup>2</sup>, 210<sup>1</sup>, 242<sup>2</sup>, 323<sup>2</sup>, 328<sup>1</sup>, 334<sup>1</sup>, 336<sup>1</sup>, 352<sup>2</sup>, 353<sup>2</sup>, 356<sup>2</sup>)</p> <p><u>Sociology (SOC)</u> 134, 219, 235<sup>1</sup>, 241, 305, 310, 325, 327<sup>1</sup>, 328<sup>1</sup>, 330<sup>1</sup>, 331<sup>1</sup>, 332<sup>1</sup>, 334, 340, 345<sup>2</sup>, 380, 381, 382, 411<sup>2</sup>, 415, 420, 435, 485</p> <p><u>Textiles and Clothing</u> 165<sup>1</sup>, 354<sup>2</sup></p> <p><u>Technology and Social Change (T SC)</u> 341, 342<sup>2</sup></p> <p><u>Women's Studies (W S)</u> 201<sup>1</sup>, 203<sup>1</sup>, 301<sup>2</sup>, 307<sup>1</sup>, 321<sup>1</sup>, 323<sup>1</sup>, 327<sup>1</sup>, 336<sup>1</sup>, 338<sup>1</sup>, 340<sup>1</sup>, 342<sup>1</sup>, 345<sup>1</sup>, 346<sup>1</sup>, 350<sup>1</sup>, 370<sup>2</sup>, 374<sup>2</sup>, 380<sup>1</sup>, 385<sup>1</sup>, 386<sup>1</sup>, 394<sup>1</sup></p> <p><u>World Languages and Cultures (WLC)</u> All except F Lng 486, 487, 490, 491, 499 (102<sup>2</sup>, 201<sup>2</sup>, 202<sup>2</sup> any foreign language) (Software Engr does not accept lang courses)</p>
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Notes: <sup>1</sup>Indicates course meets "U.S. Diversity Requirement"

<sup>2</sup>Indicates course meets "International Perspectives Requirement"

Courses listed in **bold** are humanities; courses listed in plain type are social sciences

## APPENDIX D

# MSE FACULTY RESEARCH INTERESTS

### PROFESSORS

**Mufit Akinc**

Professor and Professor in Charge, International Engagement  
Ph.D., Iowa State University

Processing of bioinspired hybrid materials; Synthesis and processing of advanced ceramic powders; Colloidal phenomena in ceramic systems; Development of IR transparent materials; Processing and properties of intermetallics; Ultra high temperature materials

**Ashraf Bastawros**

Professor  
Ph.D., Brown University

Mechanical properties of materials; Advanced characterization methods

**Nicola Bowler**

Professor  
Ph.D., University of Surrey, U.K.

Electromagnetic properties of composite materials; Electromagnetic nondestructive evaluation of dielectrics and metals

**L. Scott Chumbley**

Professor  
Ph.D., University of Illinois

Characterization of materials using electron microscopy including rare earth materials for hydrogen storage and magnetic refrigeration; High temperature oxide coatings; Forensic investigations in tool marks; Stress corrosion cracking in steels and phase development in highly alloyed steels

**Kristen Constant**

Professor  
Ph.D., Northwestern University

Photonic band gap materials; Novel fabrication of structures for electronic and optical devices; Gender studies in the sciences

**Larry Genalo**

University Professor  
and Associate Chair  
Ph.D., Iowa State University

University and K12 engineering education; Mobile robots and other engineering projects as learning tools for preservice teachers; Improving the engineering pipeline for women and minorities

**Karl A. Gschneidner, Jr.**

Distinguished Professor  
Ph.D., Iowa State University

Physical metallurgy of rare earths; Alloy theory and phase formation studies; Solid state physics; Magnetic and thermal properties of rare earth materials; Magnetic refrigeration

**David Jiles**

Distinguished Professor

Nonlinear and hysteretic behavior of magnetic materials; Magnetoelasticity, magnetostriction, and

## APPENDIX D

D. Sc., University of Birmingham, U.K.

magnetomechanical effects; Novel magnetic materials; Applications of magnetic measurements to nondestructive evaluation

### **Duane Johnson**

Professor

Ph.D., University of Cincinnati

"Computational Materials Science" - the use of modern theories of materials phenomena and their computational solution to predict properties and characterize materials; Thermodynamics & chemistry of materials via electronic-structure based methods; Mechanical properties by integration of generalized defect energy surfaces and mesoscale dislocation mechanics; Multiscale modeling for spatial and temporal scales; Energy-storage and catalytic properties of supported nanoassemblies

### **Alexander King**

Professor, Ames Lab Director

Ph.D., University of Oxford, U.K.

Transmission electron microscopy; Scanning electron microscopy; theory of defects in solids; Interfaces; Diffusion-induced grain boundary migration

### **Richard LeSar**

Lynn Gleason Professor of  
Interdisciplinary Engineering

Ph.D., Harvard University

Materials theory, modeling, and simulation; Dislocation-based plasticity; Biomolecular structure and dynamics; Microstructural evolution

### **Valery Levitas**

Schafer 2050 Challenge Professor

Ph.D., University of Hannover, Germany

Stress-and-strain-induced phase transformations; High pressure mechanics and mechanochemistry; Structural changes in materials via virtual melting; Multiscale modeling; Strain-induced chemical reactions; Large inelastic deformation of solids; Continuum thermodynamics and kinetics; Instabilities in materials and structures; Micromechanics and nanomechanics; Energetic nanoenergetic materials; Superhard materials; Smart materials

### **Surya Mallapragada**

Professor and Stanley Chair in Interdisciplinary  
Engineering

Ph.D., Purdue University

Nanomanipulation of semicrystalline polymer surfaces; Semicrystalline polymer drying; Controlled drug delivery

### **Steve W. Martin**

Distinguished Professor

Glass formation, structure, properties and dynamics; Ionic transport: dependence on glass microstructure

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Ph.D., Purdue University

and chemistry; Relaxations in glass: electrical, magnetic, mechanical and thermal stresses probed by Impedance and NMR Spectroscopies, Brillouin Light Scattering and Scanning Calorimetry; The liquid - glass transition; Chemical restructuring processes in liquids and glasses

### **Ralph E. Napolitano**

Al and Julie Renken Professor

Ph.D., Georgia Institute of Technology

Solidification and physical metallurgy; Prediction and control of microstructures; Alloy thermodynamics; Kinetics of phase transformations; Alloys, processes, and properties; Glass-formation and non-equilibrium solidification; Net-shape casting processes

### **Vitalij Pecharsky**

Distinguished Professor

Ph.D., Lviv State University, Lviv, Ukraine

Experimental thermodynamics, physical properties of binary, ternary, and multicomponent intermetallic compounds; Structure-property relationships; Advanced magnetic materials; Hydrogen storage alloys

### **Krishna Rajan**

Wilkinson Professor of Interdisciplinary Engineering

Sc.D., Massachusetts Institute of Technology

Materials informatics and combinatorial materials science; High resolution electron microscopy & nanostructural characterization of materials; Microstructural evolution in materials; Information technology applications in materials science

### **Alan Russell**

Professor

Ph.D., Iowa State University

Mechanical properties of transition metal alloys and intermetallic compounds; Deformation processed metal composites; Ultra-hard boride composites; Stress-corrosion cracking in steel

### **Dan Shechtman**

Professor & Nobel Laureate

Ph.D., The Technion

Quasi-periodic crystals; Metallic multilayers; Phase transition; Rapid solidification of metallic alloys; Structure and properties of CVD diamond wafers

### **Patricia Ann Thiel**

Distinguished Professor

Ph.D., California Institute of Technology

Formation, stability and coarsening of metal nanostructures supported on surfaces; Surfaces of complex metallic alloys

### **Rohit K. Trivedi**

Distinguished Professor

Ph.D., Carnegie University of Technology

Structure and properties of metallic surfaces; Growth mechanisms and morphologies of second phase particles

## APPENDIX D

### ASSOCIATE PROFESSORS

**Michael Kessler**

Ph.D., University of Illinois

Mechanics, processing, and characterization of polymer matrix composites and nanocomposites; Development of multifunctional materials (including the development of self-healing structural composites); Polymer matrix composites for extreme environments; Bio-renewable polymers and composites; Evaluation of these materials using experimental mechanics and thermal analysis

**Xiaoli Tan**

Ph.D., University of Illinois at

In-situ TEM study of electrically active ceramics; Ferroelectric thin films; Piezoelectric single crystals and ceramics; Deformation and fracture of metal thin films; Failure analysis of devices and components; Microwave processing

**Ersan Ustundag**

Ph.D., Cornell University

Constitutive behavior of advanced materials; Application & development of advanced neutron and X-ray scattering techniques in materials research; Micromechanics of composite materials; Mechanical behavior of and internal stresses in bulk metallic glasses and their composites; Internal stresses and constitutive behavior of electroceramics; Thin film mechanics; Mechanical behavior of composites in extreme environments; Solid state reactions & phase transformations as related to internal stress evolution

### ASSISTANT PROFESSORS

**Scott Beckman**

Ph.D., University of California, Berkeley

Materials theory, atomic scale computational modeling; Defects and interfaces in materials; Materials by design: tailoring macroscopic properties by the control of atomic-, nano-, and micro- structures; Transport at the nanoscale: electrical, thermal, and mass

**Kaitlin Bratlie**

Ph.D., University of California, Berkeley

Understanding biomolecule interactions with polymers through optical techniques in order to engineer materials for drug delivery and tissue engineering application; Relationship between structure and the foreign body response is of great interest; Employ whole animal fluorescence imaging, nonlinear optical imaging, and a variety of biochemical assays to study these phenomena

**Ludovico Cademartiri**

Materials chemistry solutions to food, water, and soil

## APPENDIX D

Ph.D., University of Toronto, Canada

crises; Plasmas as chemical tools; Quasicrystals; Non-Classical Crystallization; Tribology, Adhesion, Fracture; Dynamic Self-Assembly

### **Sumit Chaudhary**

Ph.D., University of California, Riverside

Materials for renewable energy; Nanomaterials and nanotechnology; Electronic, magnetic, and photonic materials

### **Wei Hong**

Ph.D., Harvard University

Mechanics of soft active materials; Modeling and simulation; Fracture, deformation and mass transport; Evolving microstructure of materials; Continuum mechanics and computational methods; Biomechanics

## SENIOR LECTURERS

### **Alan Constant**

Ph.D., Northwestern University

Electronic materials

### **Michael “Hogan” Martin**

Ph.D., Cornell University

Materials education

## ADJUNCT PROFESSORS

### **Iver E. Anderson**

Ph.D., University of Wisconsin

Powder metallurgy & rapid solidification; Development of high pressure gas atomization for production of fine metal powders; Fine components; Permanent magnets & high Tc superconductors

### **Matt J. Kramer**

Ph.D., Iowa State University

Materials characterization of glass forming metallic alloys; Permanent magnets; Quasicrystals; High temperature intermetallics; High temperature superconductors; Ceramics and silicates with emphasis on electron microscopy and X-ray diffraction

### **R. William McCallum**

Ph.D., University of California

Magnetic and electronic properties of ternary rare earth compounds; High temperature superconductors; Permanent magnetic materials; Microstructure effect on superconducting and magnetic properties; Fabrication of high Tc superconducting wire

## ADJUNCT ASSISTANT PROFESSORS

### **Rebecca Cademartiri**

Ph.D., University of Potsdam, Germany /  
University of Toronto, Canada

Understanding the rules of interactions between bio-molecules and materials; Designing bio-molecules/material platforms for specific applications (e.g., agriculture, food science, medicine, and bio-

## APPENDIX D

remediation); Designing slow-release systems for controlled drug delivery

**Martha Selby**

M.S., Iowa State University

Educational research: multimedia courseware, innovative presentation techniques, and computer literacy

### PROFESSORS EMERITUS

**William Larsen**

Ph.D., Ohio State University

Metallurgical engineering design and failure analysis; corrosion and oxidation; Industrial and legal applications of metallurgy

**David M. Martin**

Ph.D., Iowa State University

Properties of glasses; Fiber glass mechanics; Properties of ceramic surfaces, electron beam instruments

**Thomas D. McGee**

Ph.D., Iowa State University

Glass structure and properties; Mechanical properties in ceramic systems; Studies involving ceramic refractories and bioceramics

**John W. Patterson**

Ph.D., Ohio State University

Internal oxidation and diffusion studies of solid electrolytes; Mixed conduction in ionic compounds; Solid state electrochemistry

**John F. Smith**

Ph.D., Iowa State University

Bonding interactions and thermodynamic properties of metals; Relationships between structure and physical properties; Prediction of phase equilibria from thermodynamic data

**John D. Verhoeven**

Distinguished Professor

Ph.D., University of Michigan

Diffusion and mass transport in liquid metals; Metal solidification studies; Preparation of composite materials by directional phase transformations

**Monroe Wechsler**

Ph.D., Columbia University

Radiation effects of metals and alloys; Nuclear materials research; Phase transformation studies

**David R. Wilder**

Ph.D., Iowa State University

Phase equilibria, sintering and reaction kinetics in rare earth oxides

## APPENDIX E

MSE FACULTY DIRECTORY
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<b>Ludovico Cademartiri</b> <i>lcademar@iastate.edu</i> 3109 Gilman, 2220Q Hoover, 4-7304	<b>David Jiles</b> <i>dcjiles@iastate.edu</i> 2215 Coover 4-2664	<b>Steve W. Martin</b> <i>swmartin@iastate.edu</i> 2220E Hoover 4-0745	<b>Pat Thiel</b> <i>thiel@ameslab.gov</i> 320 Spedding 4-8985
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## APPENDIX F

<b>MSE STAFF DIRECTORY</b>
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<b>Andrea Klocke</b> Academic Advisor	2220B Hoover	294-0891 aklocke@iastate.edu
<b>Sheila Schmitt</b> Fiscal Officer	2240D Hoover	294-6118 sschmitt@iastate.edu
<b>Melissa Skinner</b> Program Assistant	2220 Hoover	294-1243 skinnerm@iastate.edu
<b>Marla Williams</b> Program Coordinator	2240E Hoover	294-0741 marlawil@iastate.edu

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APPENDIX G

UNDERGRADUATE STUDENT

2012-2013

**KERAMOS**

PRESIDENT .....	Karen DeRocher
VICE PRESIDENT .....	Ben Wallerstedt
SECRETARY .....	Yushen “Wendy” Su
TREASURER .....	Devon Schuler
HERALD .....	Michael Henrich
CHAPTER REPORTING CHAIR .....	Matthew Techentin
FACULTY ADVISOR .....	Mufit Akinc
FACULTY ADVISOR .....	Kristen Constant



**MATERIAL ADVANTAGE (ACerS, ASM, and TMS combined)**

PRESIDENT .....	Lisa Rueschhoff
VICE PRESIDENT .....	Sam Reeve
TREASURER .....	Benjamin Hagarty
SECRETARY .....	Kelsey Draus
EVENTS CHAIR .....	Bradley Pettijohn
PROGRAMMING CHAIR .....	Devon Schuler
OUTREACH CO-CHAIRS .....	Trent Borman and Hannah Powell
FUNDRAISING CO-CHAIRS .....	Ryan Kirsch and Ryan Walker
WEBMASTER .....	John Graham
HISTORIAN .....	Yushen “Wendy” Su
FACULTY ADVISOR .....	Scott Chumbley



**GAFFERS GUILD (Glass Blowing Club)**

PRESIDENT .....	Maxwell Marple
VICE PRESIDENT .....	Kelsey Draus
TREASURER .....	Bradley Williams
SECRETARY .....	Michael Zeller
FACULTY ADVISOR .....	Steve Martin

