

**BACHELOR OF SCIENCE**  
**in**  
**MATERIALS SCIENCE & ENGINEERING<sup>1</sup>**

a guide to the undergraduate degree program



**School of Materials Engineering  
Purdue University**

- -

**Last Updated  
April 8, 2021**

You Can't Make It Without Materials

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<sup>1</sup> The majority of this manual was written by Prof. Elliott Slamovich and has been updated to reflect changes in the MSE program.



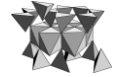
## **INTRODUCTION**

The purpose of this manual is to provide one source to address most of the questions that arise on a regular basis regarding policies and procedures in the School of Materials Engineering. The first section outlines the procedures needed to develop and implement your Plan of Study, ranging from the proposed sequence in which you take your courses to how you may petition for exceptions from standard procedures and requirements. The second section summarizes opportunities available to you beyond the standard curriculum including the Co-Op program, Student Societies, Study Abroad, Independent Research and our Honors program. While your coursework is very important, your experiences and the people you meet outside of the classroom by doing research, participating in student society activities or spending a semester in another country will have a major influence on how you think, and the career path that you choose. You are encouraged to take advantage of these opportunities.

Sincerely,

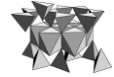
David Johnson, Undergraduate Committee Chair

Members of Undergraduate Committee: Prof. Elliott Slamovich, Prof. Robert Spitzer, Prof. Carlos Martinez, Prof. Kendra Erk, Prof. Shiram Ramanathan, Prof. Chelsea Davis, Prof. Jeffery Youngblood, Prof. Matt Krane, Rahim Rahimi, and Vicki Cline (Academic Advisor for MSE) .



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## SECTION 1. PROCEDURES AND POLICIES

### 1.1. ACADEMIC AND PROFESSIONAL CONDUCT

#### 1.1.1. Academic Dishonesty

The Purdue University Student Conduct Code is detailed in Section III-B of the Purdue University Regulations. The complete Conduct Code is available on the Office of the Dean of Students webpage. Section III-B-2 outlines misconduct subject to disciplinary penalties, and Section III-B-2a reproduced below defines academic dishonesty:

“... Cheating, plagiarism, or knowingly furnishing false information to the University are examples of dishonesty. The commitment of the acts of cheating, lying, stealing, and deceit in any of their diverse forms (such as the use of ghost-written papers, the use of substitutes for taking examinations, the use of illegal cribs, plagiarism, and copying during examinations) is dishonest and must not be tolerated. Moreover, knowingly to aid and abet, directly or indirectly, other parties in committing dishonest acts is in itself dishonest”.

Given the availability of material on the web, plagiarism on writing assignments is a particular problem, in part because most students do not understand what constitutes plagiarism. A good resource is the series of articles entitled “Avoiding Plagiarism” hosted on the Purdue Online Writing Lab (OWL): [https://owl.purdue.edu/owl/purdue\\_owl.html](https://owl.purdue.edu/owl/purdue_owl.html)

#### 1.1.2. Engineering Professional Ethics

Since most of you will be practicing Engineers in a few years you should become familiar with Engineering Ethics. The Code below was adopted by the Accreditation Board for Engineering and Technology in 1977 and is posted on our website.

Engineers uphold and advance the integrity, honor and dignity of the engineering profession by:

- I. using their knowledge and skill for the enhancement of human welfare;
- II. being honest and impartial, and servicing with fidelity the public, their employers and clients;
- III. striving to increase the competence and prestige of the engineering profession; and
- IV. supporting the professional and technical societies of their disciplines.

#### The Fundamental Canons

1. Engineers shall hold paramount the safety, health and welfare of the public in the performance of their professional duties.
2. Engineers shall perform services only in the areas of their competence.
3. Engineers shall issue public statements only in an objective and truthful manner.
4. Engineers shall act in professional matters for each employer or client as faithful agents or trustees, and shall avoid conflicts of interest.
5. Engineers shall build their professional reputation on the merit of their services and shall not compete unfairly with others.
6. Engineers shall act in such a manner as to uphold and enhance the honor, integrity and dignity of the profession.
7. Engineers shall continue their professional development throughout their careers and shall provide opportunities for the professional development of those engineers under their supervision.

Other engineering societies have their own ethical codes. An excellent resource to learn more about engineering ethics is the website [onlineethics.org](http://onlineethics.org).



## **1.2. UNDERGRADUATE DEGREE PROGRAM REQUIREMENTS**

The degree requirements for a B.S. MSE from the School of Materials Engineering at Purdue University are summarized below. The following sections will take you through the process of assembling your Plan of Study to satisfy the degree requirements.

### **Minimum Degree Requirements for Materials Engineering (B.S.MSE)**

1. Satisfy the requirements of the First Year Engineering program.
2. Satisfy the Core course sequence in Engineering, Mathematics, and Physical Sciences.
3. Satisfy the College of Engineering General Education Program (24 credit hours). This requirement has two components:
  - Foundation Learning Outcomes: select from courses approved by the Undergraduate Curriculum Council for the pertinent learning outcomes.
  - Programmatic Requirement: select from courses approved as approved by the School of Materials Engineering.
4. Have at least 18 credit hours of Technical Electives, at least 12 of which are Materials-specific, as designated by the School of Materials Engineering.
5. Have at least 125 credits total.
6. Minimum average GPA of 2.0 in MSE 200 and 300 level courses.

### **GPA Requirements**

In addition to satisfying all of the curriculum requirements and having a Graduation Index of at least 2.0, graduation with a B.S.MSE degree also requires an average GPA of at least 2.00 for all 200- and 300-level MSE courses.

### **Pass/Not-Pass Option**

Of the courses used to satisfy the minimum graduation requirements, the pass/not-pass option may be applied only to General Education courses.

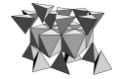
### **Exception to Normal Published Requirements**

Exception to any and all normal published requirements for graduation requires approval by petition to the Undergraduate Committee of the School of Materials Engineering. The process for petitioning is described in section 1.6.

### **Transfer Credit**

All students transferring into the School of Materials Engineering, whether from another university or another program within Purdue, are required to meet with the MSE Academic Program Administrator to plan their petition for transferring credit and to develop a Plan of Study.

Students may also transfer credit earned from other universities during the summer or from universities attended during Study Abroad. It is best to seek prior approval for transfer credit under these circumstances because a petition may be required (section 1.6). Approval for courses that count towards the Foundational Learning Outcomes (section 1.4.3.1) is made at the University level and not by the School of Materials Engineering.



**Minimum Degree Requirements  
For Materials Engineering**

Credit Hours Required for Graduation: 125

<i>Courses</i>	<i>Credit Hours</i>
<b>Mathematics and Physical Sciences</b>	
Calculus: MA 16500, 16600, 26100, 26500, and 26600	<b>18</b>
Chemistry: CHM 11500, 11600	<b>8</b>
Physics: PHYS 17200, 24100, 25200	<b>8</b>

**General Education Program**

**Foundational Learning Outcomes:**

(Courses approved by the Undergraduate Curriculum Council)

Written Communication/Information Literacy	<b>3</b>
Oral Communication	<b>3</b>
Humanities	<b>3</b>
Behavior/Social Science	<b>3</b>
Science, Technology, & Society	<b>3</b>
<b>General Education Electives:</b>	<b>9</b>

Electives are selected from approved lists with MSE faculty guidance subject to the programmatic requirements of the College of Engineering General Education Program.

**Seminars**

MSE 39000 (semesters 3-8)	<b>0</b>
---------------------------	----------

**Core Engineering Courses**

ENGR 13100, 13200 or ENGR 14100 and 14200	<b>4</b>
MSE Core: 23000, 23500, 25000, 26000, 27000, 33000, 33500, 34000, 36700, 37000, 38200, 42000, 43000, 44000 and 44500.	<b>45</b>
Integrated MSE courses, including year-long, industry-sponsored senior design projects, on the structure, properties, processing, and performance of engineering materials.	

**Technical Electives** **18**

A plan of study is designed with the help of a faculty advisor to meet each individual student's professional goals. At least 12 of the 18 credits must be approved materials-specific courses; the remaining 6 credits may be selected from an approved list of courses, including other academic disciplines.

### **1.3. MSE PROGRAM ACCREDITATION**

The degree program offered through the School of Materials Engineering is accredited by ABET, Inc., an organization that uses a peer review process to ensure educational quality. Quoting from their website: “ABET accreditation is assurance that a college or university program meets the quality standards established by the profession for which it prepares its students.” Accreditation is voluntary, and all of Purdue’s Engineering programs are ABET accredited. This means that the MSE program (along with all of the Purdue Engineering programs) is reviewed every six years to determine if the established criteria for accreditation are met. There are eight criteria that must be satisfied for accreditation, below are brief descriptions of Criteria 2 and 3 that have the greatest impact on your undergraduate curriculum.

#### **1.3.1. Criterion 2. Program Educational Objectives**

Program Education Objectives are: “broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve”. These Objectives are listed in the following text.

The degree program in Materials Engineering will provide the educational experiences to produce graduates with the knowledge and skills to excel in materials science and engineering related positions or to pursue graduate study. Within a few years after graduating, our students will:

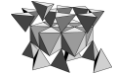
1. Be successful in top graduate schools and in professional positions within industry and commerce.
2. Contribute their Materials Engineering expertise effectively as members of engineering teams.
3. Demonstrate lifelong learning and engagement through continued professional development, and participation and leadership in professional societies and organizations.

Our success in achieving these Objectives is evaluated primarily by surveying our alumni. We also receive input from our Advisory Committee consisting of individuals in business, industry and academia, and from you during your senior exit surveys and interviews. We use the input to help make decisions about curriculum changes that would better achieve our Objectives.

#### **1.3.2. Criterion 3. Program Outcomes and Assessment**

Program outcomes describe the skill set students are expected to possess by the time of graduation. Program outcomes must facilitate attainment of the program education objectives described above. Graduates of the Undergraduate program in the School of Materials Engineering at Purdue University will have:

1. an ability to identify, formulate, and solve complex materials engineering problems by applying principles of engineering, science, and mathematics.
2. an ability to apply engineering design to produce materials engineering solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental, and economic factors.
3. an ability to communicate effectively with a range of audiences.



4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. an ability to develop and conduct appropriate experimentation in materials engineering, analyze and interpret data, and use engineering judgment to draw conclusions.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

To maintain accreditation, our curriculum must produce these outcomes, and an assessment process must be in place to measure the program's success in achieving its program outcomes. The assessment process must be designed to indicate the degree to which the program outcomes are achieved, and the assessment process must be used to develop the program through the exposure of program weaknesses and subsequent addressing of identified weaknesses. The assessment process generally includes evaluation of student work including exam performance, laboratory reports, individual and group written assignments and oral presentations, and results from student and alumni surveys.

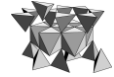
#### ***1.4. Components of the Materials Engineering Degree Program***

Links to all of the courses described below may be found in the Purdue Course Catalog, and a version of the content below with active links is available in the Undergraduate section of the MSE website. The major components of the MSE degree program are described below and summarized graphically in Figure 1.1.

##### **1.4.1. Mathematics and Physical Sciences**

A firm grasp of mathematics, chemistry and physics facilitates understanding the concepts presented in your Engineering Core Courses. Mathematics courses include Analytical Geometry and Calculus (MA 16500 and MA 16600), Multivariate Calculus (MA 26100), Linear Algebra (MA 26500) and Ordinary Differential Equations (MA 26600). Chemistry courses consist of two semesters of General Chemistry (CHM 11500 and 11600). Physics courses cover Mechanics (PHYS 17200), and Electricity and Optics (PHYS 24100 and PHYS 25200).





## Materials Engineering

College of Engineering

125 Credits for Graduation

Students must have a graduation index of 2.0

Student must have a minimum average GPA of 2.0 in MSE 200 and 300 level courses.

### Materials Engineering Major Courses (42 credits)

#### Required MSE Courses (42 credits)

- |  |  |
|--|--|
| ____ (3) MSE 23000- Structure and Prop. of Materials | ____ (3) MSE 36700 – Materials Processing Lab              |
| ____ (3) MSE 23500 – Materials Properties Lab        | ____ (3) MSE 37000 – Elec, Opt, Mag Props. of Materials    |
| ____ (3) MSE 25000- Physical Properties in Eng.      | ____ (3) MSE 38200 - Mechanical Response of Materials      |
| ____ (3) MSE 26000- Thermodynamics of Materials      | ____ (0) MSE 39000 – Seminar (taken each semester)         |
| ____ (3) MSE 27000- Bonding and Crystallography      | ____ (3) MSE 42000 – Struct. & Props. of Organic Materials |
| ____ (3) MSE 33000 – Proc. and Props. of Materials   | ____ (3) MSE 43000 – Materials Processing and Design I     |
| ____ (3) MSE 33500 – Material Characterization Lab   | ____ (3) MSE 44000 – Materials Processing And Design II    |
| ____ (3) MSE 34000 – Transport Phenomena             | ____ (3) MSE 44500 – Materials Engr Systems Analysis       |

### MSE technical Electives (18 credits) (See the MSE undergraduate manual for an approved list)

- |                                 |  |
|---------------------------------|--|
| ____ (3) Technical Elective I   | ____ (3) Technical Elective IV                             |
| ____ (3) Technical Elective II  | ____ (3) Technical Elective V or Support Area Elective I   |
| ____ (3) Technical Elective III | ____ (3) Technical Elective VI or Support Area Elective II |

### Other Departmental /Program Course Requirements (66 credits)

#### General Engineering Requirements (4 credits)

- \_\_\_\_ (2) ENGR 13100/14100 (honors) - Transforming Ideas to Innovation I  
 \_\_\_\_ (2) ENGR 13200/14200 (honors)- Transforming Ideas to Innovation II

#### Mathematics Requirements (18 credits).

- \_\_\_\_ (4/5) MA 16500/16100 - Analytic Geometry And Calculus I (satisfies Quantitative Reasoning Selective for  
 \_\_\_\_ (4/5) MA 16600/16200 - Analytic Geometry And \_\_\_\_ (3) MA 26500 - Linear Algebra  
 \_\_\_\_ (4) MA 26100 - Multivariate Calculus \_\_\_\_ (3) MA 26600 - Ordinary Differential  
 Alternative sequence to MA 265/266 is MA 26200 followed by either MA 30300 or MA 35100

#### Science Requirements (20 credits)

- \_\_\_\_ (4) CHM 11500/13600 (honors) - General Chemistry I (satisfies Science Selective for core)  
 \_\_\_\_ (4) CHM 11600/13600 (honors) – General Chemistry II  
 \_\_\_\_ (4) PHYS 17200 – Modern Mechanics (satisfies Science Selective for core)  
 \_\_\_\_ (3/4) PHYS 24100/27200- Electricity and Optics \_\_\_\_ (1) PHYS 25200 - Elec. And Optics Lab  
 PHYS 25200 may be replaced by another 1-cr hour science laboratory  
 PHYS 27200 replaces both PHYS 24100 & PHYS 25200

#### MSE General Education Requirement (24)

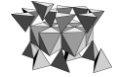
##### Foundation Core (<http://www.purdue.edu/provost/initiatives/curriculum/course.html>)

- \_\_\_\_ (4/3) Course that satisfies Information Literacy and Written Communications Selectives (e.g., ENGL 10600)  
 \_\_\_\_ (3) Course that satisfies Oral Communication for University Core (for example COM 11400)  
 \_\_\_\_ (3) G.E. I – (satisfies Human Cultures Humanities for core)  
 \_\_\_\_ (3) G.E. II – (satisfies Human Culture Behavioral/Social Science for core)  
 \_\_\_\_ (3) G.E. III – (satisfies Science, Technology & Society Selective for core)

##### MSE General Education Electives (See the MSE undergraduate manual for an approved list)

- \_\_\_\_ (3) G.E. IV \_\_\_\_ (3) G.E. V \_\_\_\_ (3) G.E. VI

Figure 1.1: Summary of the MSE degree program courses.



### 1.4.2. Materials Engineering Core Courses

The core MSE sequence begins with a general introduction into the Structure and Properties of Materials (MSE 23000) and a laboratory course investigating the properties of materials (MSE 23500). The second semester of the sophomore year sets a foundation of MSE fundamentals covering mechanics (MSE 25000); thermodynamics (MSE 26000), bonding, crystallography and statistical mechanics (MSE 27000). The junior year has the highest concentration of materials courses covering Transport Phenomena (MSE 34000), Electrical, Optical and Magnetic Properties of Materials (MSE 37000), the Mechanical Response of Materials (MSE 38200), Properties and Processing of Materials (MSE 33000), and the Structure and Properties of Organic Materials (MSE 42000). The junior year also features two laboratory courses, the first emphasizing Materials Characterization Methods (MSE 33500) while the second focuses on Materials Processing (MSE 36700). The senior design sequence (MSE 43000 and 44000) includes a yearlong group project in which students choose from a variety of industry-sponsored design projects. Senior design is complemented by Materials Engineering Systems Analysis (MSE 44500), that increases the representation of design elements in the curriculum. Every semester you are expected to participate in the Materials Engineering Seminar (MSE 39000). Activities in MSE 39000 include alumni and other visitors from industry discussing career opportunities, planning for outreach activities, and social events.

### 1.4.3. College of Engineering General Education Program

Students must satisfy the College of Engineering General Education Program. This requirement has two components: Foundation Learning Outcomes and MSE Programmatic Requirements. For the combined set of classes (sections 1.4.3.1 and 1.4.3.2) the following requirements apply:

- Students must earn a C<sup>-</sup> or better in courses that satisfy Foundational Learning Outcomes.
- At least six credit hours must be at the 30000 level or above, or from courses with a required prerequisite in the same department.
- No more than 6 credit hours from the Colleges of Engineering, Science, and Technology.

#### 1.4.3.1 Foundational Learning Outcomes

Students must select from a list of courses maintained by the Office of the Provost as part of Purdue's Undergraduate Outcomes-based Core Curriculum to satisfy the all six Foundational Learning Outcomes. These are listed below and described at:

<http://www.purdue.edu/provost/students/s-initiatives/curriculum/coreCurriculum.html>

- 1) Written Communication Foundational Outcome course taken during FYE.
- 2) Information Literacy taken during FYE.
- 3) Oral Communication Foundational Outcome course taken during FYE.
- 4) Humanities (3 credit hours, MSE requirement)
- 5) Behavior/Social Science (3 credit hours, MSE requirement)
- 6) Science, Technology, & Society (3 credit hours, MSE requirement)

During the First-Year Engineering (FYE) program the first 3 Foundational Learning Outcomes are satisfied. To satisfy the remaining Foundational Learning Outcomes, students in



MSE are required to take 3 credit hours from Humanities, Behavior/Social Science, and Science, Technology, & Society. A list of these approved courses is maintained at:

<http://www.purdue.edu/provost/initiatives/curriculum/course.html>

Note: courses taken by students in First Year Engineering that satisfy the Foundational Learning Outcomes but are not directly listed in the MSE Plan of Study will count as either an MSE Support Area Elective or as an MSE General Education Elective.

### 1.4.3.2 MSE Programmatic Requirements (9 credit hours)

A summary of the General Education Program for the School of Materials Engineering along with a list of approved courses is provided below. The faculty view courses in the arts, humanities and social science as an integral part of one's Engineering Education. The rationale for this view is described in the preamble to the General Education Program stating:

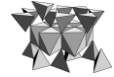
“Humanities and social sciences courses encompass the breadth of human experience and culture, both past and present, including individual behavior, social and political structures, aesthetic values, modes and dynamics of communication, philosophical and ethical thought, and cognitive processes. Such courses are an integral part of all engineering curricula which complements technical and professional content by enabling engineering students to appreciate the world in which they live and work, and to contribute as both educated members of society and aware, ethical professionals. Humanities and social sciences courses also provide a framework for rational inquiry, critical evaluation, judgment and decisions when dealing with issues that are non-quantifiable, ambiguous, or controversial. Of equal importance, they offer opportunities for engineering students to develop interests and insights that guide, enrich and expand their personal lives.” You are encouraged to make the most of this program by taking courses that are both interesting and challenging.

#### MSE General Education Courses

<b>A&amp;D</b>	105, 106, 113, 125, 200, 205, 206, 213, 216, 226, 227, 230, 235, 242, 246, 250, 255, 262, 265, 266, 270, 271, 275, 311, 312, 314, 316, 330, 332, 333, 342, 350, 362, 363, 365, 366, 368, 369, 370, 380, 381, 382, 383, 384, 385, 391, 395, 400, 421, 454, 462, 468, 470, 490
<b>AFT</b>	351, 361, 471, 481
<b>AGEC</b>	250, 296, 340, 406, 410, 415, 450
<b>ANTH</b>	100, 201, 203, 204, 205, 312, 320, 335, 336, 341, 368, 379, 390, 392, 404, 414, 425, 436, 460,
<b>ARAB</b>	101, 102, 201, 202, 301, 302
<b>ASAM</b>	24000, 34000
<b>ASL</b>	101, 102, 201, 202, 280
<b>CHNS</b>	101, 102, 107, 201, 202, 230, 241, 280, 285, 301, 302, 313, 341, 342, 490, 493 (101&102=107)
<b>CLCS</b>	235, 237, 337, 339, 385, 386
<b>COM</b>	102, 204, 210, 212, 224, 250, 251, 256, 303, 312, 314, 318, 320, 324, 325, 329, 330, 351, 352, 372, 374, 376, 381, 412, 416, 435, 491
<b>CSR</b>	342, 398
<b>DANC</b>	101, 102, 103, 130, 140, 201, 202, 203, 240, 250, 301



<b><u>ECON</u></b>	251, 252, 201, 340, 352, 355, 361, 365, 370, 375, 380, 385, 422, 456, 461, 466, 470, 471
<b><u>ENGL</u></b>	227, 230, 231, 232, 234, 235, 237, 238, 240, 241, 250, 257, 258, 262, 264, 266, 267, 276, 279, 304, 327, 331, 333, 335, 337, 350, 351, 358, 360, 365, 366, 368, 373, 377, 379, 381, 382, 386, 387, 406, 407, 409, 411, 412, 413, 414, 441, 442, 444, 460, 462, 463, 466, 470
<b><u>ESS</u></b>	265
<b><u>FR</u></b>	101, 102, 112, 201, 202, 211, 212, 230, 241, 280, 301, 302, 330, 341, 342, 380, 394, 396, 401, 402, 443, 480
<b><u>GER</u></b>	101, 102, 112, 201, 202, 211, 212, 230, 241, 280, 301, 302, 323, 330, 341, 342, 401, 402, 480
<b><u>GREK</u></b>	101, 102, 201, 202, 344, 446, 490
<b><u>HDFS (cdf)</u></b>	201, 210, 311, 312, 325, 330, 341
<b><u>HEBR</u></b>	101, 102, 201, 202
<b><u>HIST</u></b>	103, 104, 105, 151, 152, 228, 229, 240, 241, 243, 245, 271, 272, 302, 304, 317, 318, 322, 323, 324, 326, 327, 329, 330, 331, 333, 334, 337, 339, 340, 341, 342, 343, 350, 351, 355, 356, 357, 359, 360, 363, 365, 366, 371, 372, 376, 377, 382, 383, 387, 391, 392, 395, 396, 398, 403, 404, 405, 406, 407, 408, 412, 427, 439, 441, 450, 460, 461, 463, 467, 468, 469, 471, 472, 473, 475, 492, 494, 595
<b><u>IDIS</u></b>	220, 260, 271, 280, 330, 370, 371, 371F, 372, 373, 375, 376, 378, 380, 381, 420, 460, 473, 480, 481, 482, 483, 490, 490B
<b><u>ITAL</u></b>	101, 102, 105, 112, 201, 202, 211, 212, 231, 301, 330, 335, 341, 342, 394
<b><u>JPNS</u></b>	101, 102, 201, 202, 230, 241, 280, 301, 302, 341, 361, 362, 363, 401, 402, 480, 490
<b><u>KOR</u></b>	101, 202, 201, 202, 301, 302
<b><u>LATN</u></b>	101, 102, 201, 202, 344, 345, 346, 442, 443, 444, 445, 446, 490
<b><u>LC (fil)</u></b>	101, 102, 201, 202, 230, 233, 235, 239, 261, 331, 361, 368, 371, 490
<b><u>MUS</u></b>	250, 361, 362, 363, 374, 375, 378, 490
<b><u>NS</u></b>	214, 413
<b><u>PHIL</u></b>	110, 111, 114, 120, 150, 206, 219, 221, 225, 240, 242, 260, 270, 275, 280, 290, 293, 301, 302, 303, 304, 306, 402, 406, 411, 421, 425, 432, 435, 465, 490
<b><u>POL</u></b>	101, 120, 130, 141, 200, 222, 223, 230, 231, 232, 235, 237, 300, 314, 323, 326, 327, 345, 347, 348, 350, 351, 352, 353, 360, 370, 373, 410, 411, 413, 415, 423, 428, 429, 430, 432, 433, 435, 439, 460, 461, 462, 493
<b><u>PSY</u></b>	120, 200, 235, 239, 240, 251, 272, 310, 311, 314, 335, 336, 337, 350, 361, 380, 391, 392, 426, 428, 443, 444, 464, 473, 475, 484
<b><u>PTGS</u></b>	101, 102, 105, 201, 202
<b><u>RUSS</u></b>	101, 102, 111, 112, 201, 202, 211, 212, 301, 302, 330, 341, 342, 361, 362, 402, 480
<b><u>SLHS</u></b>	115, 227, 309, 368, 381, 401, 419
<b><u>SOC</u></b>	100, 220, 310, 312, 316, 324, 328, 334, 338, 339, 340, 341, 350, 367, 368, 374, 391, 402, 411, 421, 426, 429, 450, 454, 493
<b><u>SPAN</u></b>	101, 102, 112, 201, 202, 211, 212, 231, 235, 241, 280, 301, 302, 330, 335, 341, 342, 361, 362, 401, 402, 480, 481, 482
<b><u>SYS</u></b>	400
<b><u>THTR</u></b>	133, 201, 213, 233, 323, 333, 334, 336, 380, 433, 434, 440
<b><u>WGSS</u></b>	280



#### 1.4.4. Technical Electives

Eighteen credit hours of Technical Electives must be selected from lists of courses approved by the faculty of the School of Materials Engineering. At least 12 of the 18 credit hours are to be selected from the approved list of materials-related courses below. Up to 6 credit hours can be chosen from the list of Support Area Electives. You are encouraged to develop a theme in your Technical Elective Program based on your career interests, whether you intend to take a position in industry or continue your studies as a graduate student. If you would like help developing your Technical Elective Program this please feel free to consult your faculty advisor.

Approved Technical Elective courses are listed below. Detailed descriptions of MSE courses are available in the Undergraduate section of the MSE website. Most of these courses are not offered in a given semester. Therefore, each semester before registration a link to the Approved Technical Electives list is available in the Undergraduate section of the MSE website. This list highlights the courses offered during the next semester and their descriptions, and courses tentatively planned for the semester after. The list of courses offered in a given semester and their descriptions is also available outside the office of the MSE Academic Program Administrator (Vicki Cline). The faculty instructors for technical electives present an outline of their courses in MSE 390 a week or two before registration.

Descriptions of courses in other departments may be found on their respective web pages or the Purdue University Course catalog. The list below is revised periodically by the MSE faculty. *Other courses may be acceptable, subject to approval by petition to the Undergraduate Committee (see section 1.6).*

### APPROVED TECHNICAL ELECTIVES

#### MSE COURSES

MSE 49700	Introduction to Electronics Packaging and Heterogeneous Integration
MSE 49900	Independent Research
MSE 50200	Defects in Solids
MSE 50500	Modeling and Simulation of Materials Processing
MSE 50800	Phase Transformation in Solids
MSE 51000	Microstructural Characterization Techniques
MSE 51200	Powder Processing
MSE 52200	Rate Phenomena in Process Metallurgy
MSE 52300	Physical Ceramics
MSE 52400	Mechanical Behavior of Polymers
MSE 52500	Structure, Prop Relationships of Engineering Polymers
MSE 52700	Introduction to Biomaterials
MSE 53100	Quantitative Analysis of Microstructure
MSE 53600	Solidification of Casting
MSE 54700	Introduction to Surface Science
MSE 54800	Deposition Processing of Thin Films and Coatings
MSE 55000	Properties of Solids
MSE 55500	Deformation Mechanisms in Crystalline Solids
MSE 55600	Fracture of Materials
MSE 55900	Phase Equilibria in Multicomponent Systems



MSE 56000 Production of Inorganic Materials  
MSE 56700 Polymer Synthesis  
MSE 57500 Transport Phenomena in Solids  
MSE 57600 Corrosion  
MSE 56200 Soft Materials  
MSE 58600 Experimental Characterization of Advanced Composite Materials  
MSE 58900 Archeology & Materials Science

MSE 59700 Lean Manufacturing  
MSE 59700 Steel & Al: Processing & Properties  
MSE 59700 Failure Analysis  
MSE 59700 Structure Dev Polymer Processing  
MSE 59700 Sports Technology & Entrepreneurship  
MSE 59700 Kinetics of Materials  
MSE 59700 Dynamic Mechanical Properties  
MSE 59700 Dislocation Dynamics  
MSE 59700 Materials in Extreme Environments  
MSE 59700 Design Global Sustainability  
MSE 59700 Design Global Sustainability II  
MSE 59700 Solid State Materials  
MSE 59700 Intro to Materials Science of Rechargeable Batteries  
MSE 59700 Intro to Computational Material Science  
MSE 59700 Modeling & Simulation of Materials  
MSE 59700 Magnetic Materials Nano Fundamentals & Applications  
MSE 59700 Additive Mfgr of Materials  
MSE 59700 Hypersonic Materials  
MSE 59700 Deformation Processing  
MSE 59700 Appl Synth Energ Mtls & Related Sys

**APPROVED COURSES IN OTHER DEPARTMENTS**

A&AE 55200 Nondestructive Evaluation of Structures & Materials  
A&AE 55300 Elasticity in Aerospace Engineering  
A&AE 55400 Fatigue of Structures & Materials  
A&AE 55500 Mechanics of Composite Materials  
A&AE 59000 Manufacturing of Advanced Composite Materials  
CHE 44200 Chemistry & Engineering of High Polymers  
CHE 54300 Polymerization Reaction Engineering and Reactor Analysis  
CHE 54400 Structure & Physical Behavior of Polymer Systems  
CHE 59700 Organic Electronic Materials & Devices  
ECE 30500 Semiconductor Devices  
ECE 55700 Integrated Circuit Fab Lab  
IPPH 56200 Introduction to Pharmaceutical Manufacturing Processes  
ME 41300 Noise Control  
ME 47300 Engineer Design Modern Materi  
ME 50700 Laser Processing  
ME 55400 Patents, Licensing and Tech Entrepreneurship – ONLY 1 credit hour course  
ME 55500 Composites & Polymer Processing



ME 55900	Micromechanics of Materials
ME 59700	Environmentally Sustainable Design & Manufacturing
NUCL 49700	Fuel Cell Engineering
PHYS 54500	Solid State Physics
PHYS 57000	Propulsion Design, Build, Test
PHYS 57000	Phys Chemistry & Nanomaterials
PHYS 57000	Fundamental Atomic Force Microscopy
PHYS 57000	Phys & material Science of Semiconductor Nanostructures

### 1.4.5. Support Area Electives

The list of Support Area Electives below is divided into three categories: Communication, Mathematics and Basic Science, and Engineering Support. These courses are not directly related to Materials Engineering, but will help you improve your written or oral communication skills (e.g., Speech Writing and Analysis) or provide greater depth to topics touched on in MSE courses (e.g., Statistics). Up to 6 credit hours of your Technical Elective Program may be satisfied using Support Area Electives. The Support Area Electives list is also available in the Undergraduate section of the MSE website.

#### Communication:

COM 25200	Journalistic Writing
COM 31400	Advanced Public Speaking
COM 32500	Interviewing – Principle and Practice
COM 45300	Reporting of Science News
COM 49500	History of Marketing the President (MGMT 490)
ENGL 30400	Advanced Composition
ENGL 390A00	Practicum in Tutoring Writing
ENGL 39100	Composition for English Teachers
ENGL 40600	Review Writing
ENGL 40900	Introduction to Fiction Writing
ENGL 42000	Business Writing
ENGL 42100	Technical Writing
PSY 27200	Industrial Organizational Psychology
Foreign Language	#Any level 201 or higher

#### Engineering Support:

AAE 25100	Introduction to Aerospace Design
AAE 53500	Propulsion Design, Build, Test
ABE 20500	Computations Engr Sys
BME 55100	Tissue Engineering
CE 20300	Princ & Pract Geomtics
ChE 59700	Medical Device development & Clinical Appl
CE 52400	Legal Aspects in Engineering Practice
ECE 17000	EPICS for Freshmen – 3 hrs total
ECE 20001	Elect Engr Fund
ECE 20100	Linear Circuit Analysis
ECE 20200	Linear Circuit Analysis II
ECE 20700	Electronic Measurement Techniques
EEE 300/CE 55900	Environmental & Ecological Systems
ECE 49500	Entrepreneurship



EPICS	EPICS – 2 semesters required (EPCS 201-202, 301-302, 401-2)
IE 33000	Probability & Statistics for Engineers II
IE 34300	Engineering Cost Analysis
IE 59000	Advanced Manufacturing
IE 59000	Adv. Nanomanufacturing
ME 20000	Thermodynamics I
ME 27400	Basic Mechanics II
ME 44400	Computer-Aided Design And Prototyping
ME 49200	Technology & Values
MGMT	(courses 3XX or greater are acceptable; prerequisite of MGMT 20000)
MSE 48900	Ethics in Engineering Practice
NUCL 20000	Intro Nucl Engineering
NUCL 56300	Direct Energy Conversion
OBHR 30000	Mgmt of Human Resources (under MGMT)

### Mathematics and Basic Sciences

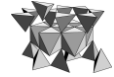
BIOL 23000	The Biology of the Living Cell
CHM 26100	Organic Chemistry
CHM 26200	Organic Chemistry
CHM 26300	Organic Chemistry Lab
CHM 26400	Organic Chemistry Lab
CHM 37300	Physical Chemistry
CHM 37400	Physical Chemistry
CS 15900	C Programming
CS 37300	Data Mining and Machine Learning
EAPS 24300	Earth Materials
EAPS 37500	Fossil Fuels & Society
IPPH 56200	Intro to Pharmaceutical Manufacturing Process
MA 30300	Diff. Eqs. and Partial Diff. Eqs. for Eng. and the Sciences
MA 30400	Diff. Eqs. and Analysis of Nonlinear Systems for Eng. and the Sciences
MA 34100	Foundations of Analysis
MA 36200	Topics in Vector Calculus
PHYS 31000	Intermediate Mechanics
PHYS 33000	Intermediate Electricity & Magnetism
PHYS 34200	Modern Physics
PHYS 55000	Quantum Mechanics
STAT 31100	Introductory Probability
STAT 350 /51100	Statistical Methods (equivalent courses)
STAT 51200	Applied Regression Analysis
STAT 51300	Statistical Quality Control
STAT 51400	Design of Experiment
STAT 51600	Basic Probability and Applications

*Support Electives cannot be taken pass/no pass, or satisfied by exam or test out.*

*Other courses may be acceptable, subject to approval by petition to the Undergraduate Committee.*

#200 level or higher foreign language course. These courses appear on BOTH General Education and Support Elective Lists, but can be taken to fulfill only ONE requirement. The foreign language courses are exceptions. Other general education courses are not permitted as support area electives.





#### **1.4.6. Open Electives**

As mentioned in section 1.2 there exist circumstances where you have satisfied the MSE program requirements without reaching the required 125 credits required for graduation. In these cases students may complete any Purdue courses to meet the minimum 125-credit total. Further, there are no rules against exceeding the 125-credit minimum with courses of your choosing.

### **1.5. ASSEMBLING YOUR PLAN OF STUDY**

All students must maintain a written plan of study for their MSE degree program and have it approved each semester before registration. Ideally, you will follow the “Recommended Plan of Study Sequence” as shown in Table 1.1; however, alternative sequences are acceptable, especially in cases where students are involved in the Co-Op (section 2.1) or Study Abroad (section 2.3) programs. The most up to date forms needed for registration are available through MSE 39000, or will be distributed via e-mail.

**Sophomores** should meet with their MSE faculty advisor to develop a Plan of Study. If you have identified any general education or technical electives you plan to take in the future please indicate this on your plan of study.

**Juniors** are also assigned a specific faculty advisor, with whom they are to meet with an updated plan of study and an updated plan for their technical electives. Junior students registering for their senior year should review their academic history to determine they have fulfilled the requirement of an average 2.0 GPA for all MSE 200 and 300 courses. If the GPA for stated courses is below 2.0, then action should be taken to repeat necessary course(s) in the senior year to raise the GPA for that requirement to the minimum of 2.0 or greater.

**Seniors** Graduating seniors must also have approval from a faculty advisor, and should ensure that their final semester plan of study will meet all the requirements for graduation.

**When you arrive** for your academic counseling session you should bring hard copies of three forms: 1. Your Plan of Study, 2. Your Materials Engineering Graduating Checklist and 3. Your Next Semester’s Registration Form. These forms are available through MSE 39000 or will be distributed via e-mail. After faculty advisor approval of your plan of study, he or she will sign the registration form. Next, return the completed Registration Form for the upcoming semester to Vicki Cline for the access code required to register.

#### **1.5.1 Planning Ahead**

If you are considering participating in Co-Op or Study Abroad, you need to be aware that either MSE 33500 or 36700 is a prerequisite for MSE 43000, the first semester of the MSE senior design sequence. Not fulfilling the MSE 43000 prerequisites could delay your graduation date. The Undergraduate Committee will be happy to work with you to develop a Plan of Study to facilitate your participation in Co-Op or Study Abroad. For all other students considering alternative sequences (e.g., due to internships, etc.), it is very important to work with your faculty advisor to prepare an acceptable Plan of Study.



## Suggested Plan of Study for the B.S. MSE Degree

### Freshman Year

#### First Semester

- (4) MA 16500 (Analytic Geometry And Calculus I)
- (4) CHM 11500 (General Chemistry I) or CHM 13600 Honors
- (4/3) Written Communication Foundational Outcome course
- (2) ENGR 13100 or 1 (Transforming Ideas to Innovation I)  
or ENGR 14100 (Honors version)

(14 or 13)

#### Second Semester

- (4) MA 16600 (Analytic Geometry And Calculus II)
- (4) CHM 11600 (General Chemistry II) or CHM 13600
- (4) PHYS 17200 (Modern Mechanics)
- (4/3) Oral Communication Foundational Outcome course
- (2) ENGR 13200 (Transforming Ideas to Innovation II)  
or ENGR 14200 (Honors version)

(17)

### Sophomore Year

#### Third Semester

- (3) MSE 23000 (Structure and Properties of Materials)  
Prerequisites: CHM 11500, MA 16500
- (3) MSE 2<sup>nd</sup> year course\*
- (3) MSE 2<sup>nd</sup> year course\*
- (4) MA 26100 (Multivariate Calculus)
- (3) MA 26500 (Linear Algebra)

- (0) MSE 39000 (Seminar)

(16)

#### Fourth Semester

- (3) MSE 2<sup>nd</sup> year course\*
- (3) MSE 2<sup>nd</sup> year course\*
- (3) PHYS 24100 (Electricity and Optics)
- (3) MA 26600 (Ordinary Differential Equations)
- (1) PHYS 25200 (Elec. And Optics Lab)
- (3) General Education Elective
- (0) MSE 39000 (Seminar)

(16)

#### \*MSE 2<sup>nd</sup> year courses:

- MSE 23500 Materials Properties Laboratory  
Prerequisites: CHM 11500, MA 16500
- MSE 25000 Physical Properties in Engineering Systems  
Prerequisites: PHYS 17200; Corequisites: MSE 23000, MA 26500 (or MA 26200)
- MSE 26000 Thermodynamics of Materials  
Prerequisites: MA 26100, Corequisites: MSE 23000, CHM 11600 (or CHM 13600)
- MSE 27000 Atomistic Materials Science  
Corequisites: MA 26100, MA 26500 (or MA 26200), MSE 23000

### Junior Year

#### Fifth Semester

- (3) MSE 3<sup>rd</sup> year Lab course\*\*
- (3) MSE 34000 (Transport Phenomena)  
Pre-MA 26600 (or MA 26200), MSE 26000
- (3) MSE 37000 (Elec, Opt, and Mag. Props. of Materials)  
Prerequisites: MSE 23000, MSE 27000, PHYS 24100 (or PHYS 27200)
- (3) MSE 420 (Structure & Props. of Organic Matls.)
- (3) General Education Elective
- (0) MSE 39000 (Seminar)

(15)

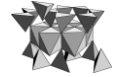
#### Sixth Semester

- (3) MSE 3<sup>rd</sup> year Lab course\*\*
- (3) MSE 33000 (Proc. and Props. of Matls.)  
Prerequisite: MSE 23000
- (3) MSE 38200 (Mechanical Response of Materials)  
Prerequisites: MSE 25000, MA 26500 (or MA 26200)
- (3) General Education Elective
- (3) Technical Elective
- (0) MSE 39000 (Seminar)

(15)

#### \*\*MSE 3<sup>rd</sup> year Lab courses:

- MSE 33500 (Materials Characterization Laboratory) -- Prerequisite: MSE 23500
- MSE 36700 (Materials Processing Laboratory) -- Prerequisites: MSE 23500, MSE 26000



**Senior Year**

**Seventh Semester**

- (3) MSE 43000 (Materials Processing and Design I)  
Prerequisites *MSE 33500 or 36700*
- (3) MSE 44500 (Materials Engineering Systems Analysis)  
*Pre-MSE 33000, 34000, Co-MSE 43000*
- (6) Technical Electives
- (3) General Education Elective
- (0) MSE 39000 (Seminar)

**Eighth Semester**

- (3) MSE 44000 (Materials Processing and Design II)  
Prerequisites *MSE, 43000*
- (9) Technical Electives
- (6) General Education Electives
- (0) MSE 39000 (Seminar)
- (18)

**Notes:**

Students entering the School of Materials Engineering should have completed the sequence of CHM 11500 and 11600 or the sequence of CHM 12300 and 12400 (or CHM 13600).

Eighteen credit hours of general education electives are chosen in accordance with the general education requirements of the Schools of Engineering.

Eighteen credit hours of technical electives must be selected from lists of courses approved by the faculty of the School of Materials Engineering. At least 12 of the 18 hours are to be selected from an approved list of Materials courses. Up to 6 hours can be chosen from a separate list of courses, which includes other Support Areas.

Of the courses used to satisfy the minimum graduation requirements, the pass/not-pass option may be applied only to the 9 credits of unspecified general education electives.

Phys 25200 is a 1-cr hour lab course. It may be replaced by another 1-credit hour stand-alone science lab course such as CHM 25700L (which compliments CHM 25700) or CHM 26300. Another possibility is to take PHYS 27200 (Electric And Magnetic Interactions), a 4-credit hour course which will count for PHYS 24100 (3-credit hour) and PHYS 25200 (1-credit hour).

The preferred math sequence includes MA 26500 and MA 26600. Under certain circumstances MA 26200 (Linear Algebra And Differential Equations) and either MA 30300 (Differential Equations and Partial Differential Equations for Engineering and the Sciences) or MA 35100 (Elementary Linear Algebra) may be approved to replace MA 26500 and MA 26600



## **1.6. PETITIONING**

Exceptions to any of the published requirements for graduation require approval by petition to the Undergraduate Committee of the School of Materials Engineering. A petition from a student to the Undergraduate Committee is specifically required for the following:

- A. Acceptance of credit from Study Abroad programs for courses not receiving prior approval.
- B. Approval of Technical, Support Area, or General Education Electives not on current lists.
- C. Consideration of any other exceptions to normal graduation requirements.

Petitions are submitted as a memo addressed to the Undergraduate Committee and include the following:

- 1. A general statement of the request and its rationale.
- 2. In case B above, a course description and syllabus (if available) for potential addition to the General Education or Technical Electives list.

The Undergraduate Committee will consider each petition and provide a formal written response to the student.

## **SECTION 2. OPPORTUNITIES**

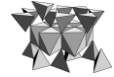
### **2.1. THE CO-OP PROGRAM**

Cooperative Education is a formal plan of education in which a student alternates sessions of full-time work with sessions of full-time study. Purdue's Cooperative Education Program (Co-Op) is a professional development experience, designed to combine practical on-the-job experiences with the classroom training of a four-year college curriculum. It helps students integrate theory and practice, confirm career choices, investigate potential job opportunities, and become better graduates. At the same time, it allows students to earn money and help finance their education. For general information on the Co-Op program please see <https://opp.purdue.edu/>

There are both 3-session and 5-session Co-Op programs described at the Office of Professional Practice (OPP) website (<https://opp.purdue.edu/>). When planning your work sessions, be aware that the yearlong MSE senior design sequence requires that MSE 43000 and MSE 44000 be taken in order during the same year (fall and spring semesters). Some MSE courses are offered during summer semester and these typically are MSE 23000, MSE 23500, MSE 33000, and MSE 36700. Students interested in the Cooperative Education program should talk with the MSE Co-Op advisor (Prof. David Johnson, davidjoh@purdue.edu).

### **2.2. INTERNSHIPS AND SUMMER RESEARCH EXPERIENCE**

Even if you are not a Co-Op student, it is still important that you experience Materials Engineering outside of the classroom either in an industrial or research setting. Summer is a particularly good time for industrial internships or university or National Laboratory research experience. Job fairs, especially the Industrial Roundtable during the fall semester, are great settings to make contacts for internship opportunities. When looking for summer research programs at universities, a good place to start is the National Science Foundation's Research Experience for Undergraduates (REU) program that sponsors summer research at universities



across the United States. You can search for more information about the REU program at [www.nsf.gov](http://www.nsf.gov). Also, the College of Engineering sponsors a Summer Undergraduate Research Fellowship Program, or SURF, that affords research experience for undergraduates. The program runs from late May through early August; information regarding this program can be found at: <https://engineering.purdue.edu/Engr/Research/SURF/>. Note that the application dates are early in the spring semester. It is generally best to identify a faculty member with whom you want to work, and to discuss whether they can support you in this program.

### **2.3. MATERIALS ENGINEERING STUDY ABROAD (MESA)**

In recent years increasing numbers of MSE students have been spending a semester or a year overseas via the Study Abroad Program. You can learn more about Purdue's Study Abroad Program in general by visiting [www.studyabroad.purdue.edu](http://www.studyabroad.purdue.edu). The experiences of many of the Materials Engineering students who participated in Study Abroad may be found in the Study Abroad link in the undergraduate section of the MSE webpage. The purpose of this section is to provide information to help you prepare for Study Abroad. Below are some general comments about Study Abroad followed by information about specific Study Abroad locales.

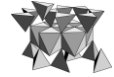
- **Start your preparations as early as possible!** Typically students take Study Abroad during their junior year, but some go as early as their sophomore year. Virtually all students deviate from the "Recommended Plan of Study Sequence" (section 1.3), so advanced planning is necessary to determine which courses should be taken earlier and which should be delayed. Please remember, you will also need to apply through the Study Abroad Program, and there are deadlines for the various programs in their office. <http://www.studyabroad.purdue.edu/>
- Study Abroad enhances your education and students are encouraged to take advantage of this opportunity. The specific changes needed to your Plan of Study depend on your Study Abroad locale and should be discussed with your faculty advisor.
- In general, it is easier to satisfy Technical and General Education electives than Core Courses during Study Abroad. This is in part due to relatively few courses equivalent to Core Courses, and in part because acceptable courses at a given university may not be offered on a regular basis. For a given Study Abroad locale there are exceptions to this general rule and they are detailed below.
- Courses from Study Abroad locales must be approved for Purdue credit, beginning with the Office of Study Abroad. Vicki Cline maintains a list of courses that have been previously approved for Study Abroad. Consulting with her before selecting your courses may save you some time and trouble.

#### **2.3.1. Comments About Specific Study Abroad Locales**

##### **University of New South Wales – Sydney, Australia**

Most students attending UNSW have done so during the spring semester. Courses equivalent to MA 26600 and MSE 38200 have been available in past years. Several courses acceptable as Technical or General Education electives are available at UNSW.

##### **Tohoku University – Sendai, Japan**



Study Abroad at Tohoku University may be undertaken for either one semester or for a full year. Courses equivalent to MSE 25000 and MSE 26000 have been available in past years. Further, students who stayed for a full year completed their Senior Design requirement (MSE 43000 and 44000) through laboratory research at Tohoku. Several Technical and General Education electives are also available.

### **Imperial College – London, England**

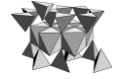
MSE students have attended Imperial College during the spring and summer, taking General Education courses. Courses equivalent to MSE 26000, 33000 and MSE 37000 were available during the spring semester in past years. Also available were several Technical Elective courses.

### **Introduction to Intercultural Teamwork in China**

A two week program that emphasizes collaborative strategies with cultural diversity is offered during Maymester involving engineering and liberal arts majors. Students visit three universities and cities such as Beijing, Harbin, Shanghai and Ningbo. Course size is limited so apply early!

### **Other programs chosen by MSE students are:**

- University of Madrid - Spain
- National University of Ireland – Galway
- University of Florence – Italy
- Global Leadership and Innovation Program – Greece
- Karlsruhe University – Germany
- University of Grenoble – France



## **2.4. MSE 499 RESEARCH IN MATERIALS ENGINEERING**

The course MSE 49900 provides the opportunity for laboratory and/or library research beyond the scope of the ordinary undergraduate curriculum, working in a research environment under the direct guidance of a faculty member. Independent Research (MSE 49900) may be taken for 1, 2 or 3 credits in a given semester, and up to 6 credits of MSE 49900 can count towards fulfilling your Technical Elective Program. To enroll in MSE 49900 your first step is to find a member of the faculty who is willing to supervise your research project. Next you should arrange a meeting with the faculty member to inquire if he/she is willing to act as your research advisor and discuss possible projects. After finding a faculty advisor you should submit a petition to the Undergraduate Chairman for approval of your MSE 49900 project. A template for your petition can be found at: [https://engineering.purdue.edu/MSE/foryou/undergraduate/Research\\_Opportunities](https://engineering.purdue.edu/MSE/foryou/undergraduate/Research_Opportunities)

### **Submission procedure to schedule MSE 499:**

- 1) Email your MSE 49900 petition to: [Mse499-list@ecn.purdue.edu](mailto:Mse499-list@ecn.purdue.edu)
- 2) In the email, you will need to indicate how many credit hours they are seeking by using

MSE 49900A - 1 credit hour

MSE 49900B - 2 credit hours

MSE 49900C - 3 credit hours

- 3) You will also need to “cc” your faculty advisor. The faculty advisor can then reply with their “approval” for an electronic signature.

- 4) Use the scheduling assistant to request a department approval override of one of the following:

MSE 49900A - 1 credit hour

MSE 49900B - 2 credit hours

MSE 49900C - 3 credit hours

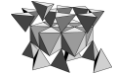
- 5) After approval, use the scheduling assistant again to actually add the course to your schedule.

### **Notes:**

1) For every credit of MSE 49900 taken, you are expected to provide 3 hours per week of available time in your schedule during regular business hours (8 AM – 5 PM) for laboratory or library research.

2) Due to safety concerns, MSE 49900 research performed outside regular business hours must be accommodated by special arrangement and is the exception rather than the rule.

3) Students taking MSE 499 for 3 credits may substitute 3 of the weekly laboratory hours for a one hour research meeting with their advisor.



## **2.5. SOCIETY OF MATERIALS SCIENCE ENGINEERS (SMSE)**

The Society of Materials Science Engineers is a student chapter representing the major MSE professional organizations including the Materials Research Society (MRS), the American Ceramic Society (ACerS) and the Minerals, Metals and Materials Society (TMS) and the Iron and Steel Society. Membership in the above national organizations is possible by joining the “Materials Advantage”. Joining this single organization, provides a student with official membership all of the four listed national organizations. The student group, SMSE, promotes communication among students in Materials Engineering, holds social events like pizza dinners and pool tournaments, and outreach. For more information please visit the Student Societies link on the Materials Engineering Home page.

## **2.6. SCHOLARSHIPS AND AWARDS**

**There is an official application that MUST BE COMPLETED to be considered for a scholarship in MSE.** The link will be found on the MSE undergraduate website. The due date for application is a “hard” date and all applications must be submitted by that date with no exceptions. This date is typically in May but may change from year to year. The actual date and relevant information will be presented in MSE 39000, and through school-wide e-mail messages.

Undergraduate scholarships fall into three categories. Scholarships and awards exclusively for Purdue MSE students include the John Deere Foundation, the Sopcak Memorial, the Matthew M. Slone Academic Excellence Award, and the John Bray Award. Other companies that award scholarships include U.S. Steel, Alcoa, and Precision Cast Parts. Purdue University also provides a limited number of awards including the Graduating Student Awards. Finally, national societies like the American Society for Metals (ASM) and the Minerals, Metals and Materials Society (TMS) have annual scholarship competitions.





## **2.7. HONORS PROGRAM**

The overall academic criteria for the School of Materials Engineering (MSE) Upper-Division Component of the College of Engineering Honors Program (CoEHP) needed to earn a “BS-MSE with Honors” are described below. These requirements are consistent with EFD 07-09.

### **ACADEMIC REQUIREMENTS:**

1. Eligibility – entry into the MSE Upper-Division Component of the CoEHP is based on minimum overall GPA of 3.7 (or the CoEHP required GPA if it is more restrictive) as well as the ability to complete programmatic requirements by graduation. Students eligible for the program are typically notified by the Engineering Honors Program.
2. Honors Completion – To complete the College of Engineering Honors Program and earn a “BS-MSE degree with Honors,” participants must have:
  - a) completed the course requirements for a bachelor of science in MSE; and
  - b) earned a minimum of 24 honors points, 12 of which are specific to MSE, with the remaining points accumulated from non-MSE honors courses; and
  - c) possess an overall GPA of 3.7 (or the CoEHP required GPA if it is more restrictive) at the time of graduation; and
  - d) completed a significant research or design experience that resulted in a public scholarly activity such as an oral or poster presentation. Note that MSE 430 or MSE 440 cannot count towards meeting this requirement.
  - e) Also, students must participate in the required sophomore and junior CoEHP Honors Seminar, in addition to any required MSE seminar courses.
3. MSE Specific Honors Points – students must earn a minimum of 12 honors points from approved research/design experiences and coursework. These include:
  - a. 3 to 6 credit hours (negotiated with the research advisor) of MSE 499 Undergraduate Research. Students must complete a significant research experience. Following completion of the entire project, their results should be presented as part of a public scholarly activity.
  - b. Up to 9 credit hours of any 500-level MSE course. Such courses may be used to satisfy BS-MSE degree requirements or reserved for possible graduate credit.

### **2.7.1 SUPPLEMENTARY INFORMATION:**

4. Participants must maintain a minimum overall GPA of 3.7 (or the CoEHP eligibility GPA if it is more restrictive) to be in good standing. Students falling below the required eligibility GPA will be placed on Honors probation. Students on Honors probation will have one semester (excluding summer sessions) to re-establish their eligibility. Failure to re-establish eligibility will result in the forfeiture of all rights and privileges afforded CoEHP participants. Rights and privileges may be reinstated once eligibility is re-established.
5. The MSE Undergraduate Committee will bring proposed modifications to the MSE honors program, including the minimum GPA criterion, to the MSE faculty for a vote.
6. The effective date of this document is Fall 2011. Students involved in and satisfying MSE Honors requirements prior to this document will be allowed to complete said program using their previously established criteria.