I. INTRODUCTION

New graduate students have two readily accessible sources of information about Graduate studies in Materials Engineering: The Graduate Office in ARMS 2315, 494-4103, and the Chair of the Graduate Committee, who is the student’s temporary academic advisor until they have a major professor. The student’s major professor chairs the advisory committee, supervises research, and is course registration advisor. The process of selecting an advisor will be described by the Graduate Chair.

The following information is provided to supplement the The Graduate School Bulletin and the Policies and Procedures Manual for Administering Graduate Programs of the Graduate School. These may be found under information for Current Students > Graduate School Publications, at the Graduate School website: http://www.gradschool.purdue.edu

II. ADMINISTRATIVE INFORMATION

A. GENERAL INFORMATION about your graduate program is available through the Graduate Office in ARMS 2315 and the School website, including the MSE Graduate Student Association (MSEGSA) page.

B. MAIL is received in your assigned mail slot in ARMS 2300. Be sure to check your mailbox DAILY.

The current mailing address is:

School of Materials Engineering  
Purdue University  
Neil Armstrong Hall of Engineering  
701 West Stadium Avenue  
West Lafayette, IN 47907-2045

C. PHONE CALLS for business should be directed to the telephone in your laboratory or in the main office, whenever possible. Personal calls should be taken on your personal (cell) phone. Messages received through the Main Office number, 765-494-4100, (internal extension 4-4100) will be put in your mailbox or otherwise transmitted.

D. BUSINESS OFFICE services are provided in ARMS 2201. There you will find forms to request approval to travel on business, to be reimbursed for business travel expenses, to be absent from campus (e.g., vacation), and to make purchase orders for research supplies.
E. KEYS for the buildings, laboratories, offices and research space necessary for your work will be authorized by your major professor through the Laboratory Coordinator, ARMS 2309. No laboratory keys will be assigned until safety training is completed.

F. OFFICE and research space assignments are made at the beginning of the Fall semester. Proper care and utilization of both the desk and laboratory space is your responsibility. In addition to ARMS and MSEE buildings, some Materials Engineering research laboratories are located in the Physics Bldg. Laboratories and student offices are also located in the Birck Nanotechnology Center. A tour of the Birck facility for all incoming students is scheduled during the fall semester.

G. LABORATORIES other than assigned research areas are available for general use through the Laboratory Coordinator, ARMS 2309. Rules and regulations governing the use of the labs are established by the staff member in charge and the Laboratory Coordinator. Service staff members in charge of individual laboratories are available to assist you in the use of the facilities. Safety training is required before use of any of the labs. The Chair of the Safety Committee will supply details about the training schedule and the requirements for purchasing chemicals.

H. LEAVE FROM CAMPUS FORMS, available in the Business Office, ARMS 2201, must be completed and approved before temporary departure from campus, such as for attendance at an out-of-town seminar or conference, research duties at another location, vacation, or other authorized activity, and is approved by the major professor. In case of emergency requiring absence from campus, students should inform their advisor and the main office as soon as possible.

I. VACATION POLICY is set and approved by the major professor, consistent with applicable laws and University regulations (such as accrual rates). Vacation forms are available in the Business Office, ARMS 2201.

III. STIPEND INFORMATION

University appointment for graduate students in the School of Materials Engineering is subject to the following rules:

Appointments are based on a variety of factors, including registration for courses, research funds, and the recommendation of the major professor. Financial appointments will be given only to those students maintaining satisfactory academic progress.

Students normally will be offered 1/2-time Graduate Research Assistant appointments, which consists of stipend, tuition, the majority of fees and insurance. Students admitted as "self-supported", such as industrially or government sponsored students, are not guaranteed an appointment should their sponsor withdraw funding.
Summer appointments should be expected for students who satisfactorily complete their first academic year of graduate study.

Master's students should complete their studies within two years. *Financial support after the end of the second year will be awarded to Master’s students by approval of the major professor pending satisfactory progress and is subject to available funding.*

Normally appointed PhD students (1/2 time Graduate Research Assistant), who are not self-supported or on fellowship may receive a raise in stipend upon successful completion of the Preliminary Examination. It is the responsibility of the graduate student to complete necessary paperwork and/or notify the relevant staff members of this change.

**IV. GENERAL PROGRAM REQUIREMENTS**

A. **MAJOR PROFESSOR(S) AND ADVISORY COMMITTEE** – The student shall, before the end of the first full semester of residence, select a major professor or professors (co-advisors) on a mutually acceptable basis. The Advisory Committee, consisting of the major professor(s) as chair and at least two (MS) or three (PhD) other faculty members selected by the student and major professor, will assist the student in the program.

B. **LANGUAGE REQUIREMENT** - All students are required to demonstrate acceptable proficiency in English before an advanced degree may be obtained. Non-native English speaking students must be certified for oral English proficiency before they can serve as a graduate instructor (Section IV. E). A student may be certified in oral English proficiency by any one of the following:
   - A score of 7.0 or above on the IELTS (8.0 or above starting Fall 2011)
   - A score or at least 27 on the speaking portion of the TOEFL
   - A score of 50 or above on Purdue’s Oral English Proficiency Test
   - Successful completion of ENGL 620

Incoming students who are not certified in oral English proficiency are required to begin working immediately to satisfy this requirement.

C. **PLAN OF STUDY** - The student, in consultation with the major professor(s) and Advisory Committee, shall prepare a Plan of Study for approval by the Graduate School. The Plan of Study should be appropriate to meet the needs of the student’s field, as determined by the Advisory Committee. The plan of study may incorporate up to 6 credit hours of 300- or 400-level Materials Engineering courses to be taken in order to provide the background needed for advanced study in Materials Engineering. Coursework requirements for the specific degree programs are listed below. The plan of study is prepared and submitted for approval to the Graduate School electronically. The plan of study must be approved by the end of the first semester of an MS degree program and by the end of the second semester of a PhD degree program.
D. ETHICAL CONDUCT (OF RESEARCH) – MSE graduate students should be familiar with and adhere to the Purdue University Statement of Integrity and Code of Conduct available at: http://www.purdue.edu/purdue/about/integrity_statement.html. In addition a mandatory lecture on Ethical Conduct of Research will be offered during the Fall semester every year. During this lecture first year MSE graduate students will be instructed to perform the “Responsible Conduct of Research” for Physical Sciences from the Collaborative Institutional Training Initiative (CITI). Second and higher year students will be provided assignments to explore specific topics in ethics in research. Students who are unable to attend this mandatory seminar are required to discuss the topics covered with their research advisors.

E. MATERIALS ENGINEERING TEACHING EXPERIENCE (METE) – Developing teaching ability is a valuable part of graduate education, regardless of career path. To this end, all students will serve as a graduate instructor under faculty direction as part of their graduate degree program. MS students will serve one semester and PhD students will serve two semesters. Each semester a student serves as a graduate instructor they will also be enrolled in MSE 697 METE, which meets variably throughout the semester to augment the teaching practice with lectures, seminars and discussions of general teaching methods, as well as aspects specific to MSE. Students should discuss with their advisor(s) their individual goals and/or preferences for the teaching experience. Most undergraduate course and some graduate courses are possible assignments. Although not all requests for particular assignments can be accommodated, the earlier goals/plans are discussed with the METE coordinator the more likely they can be accommodated. During semesters when teaching, appointments will be adjusted to include a ¼-time Teaching Assistantship, with a corresponding reduction in any Research Assistantship.

F. THESIS PREPARATION – General information on thesis preparation, including format specifications, is available in the Graduate School publication, A Manual for the Preparation of Graduate Theses – found under information for Current Students > Graduate School Publications, at the website: http://www.gradschool.purdue.edu. All arrangements for preparation of the thesis are the responsibility of the student. A copy of the thesis should be delivered to each Examining Committee member at least two weeks prior to the date of the final examination (defense). A copy also should be submitted at this time to the Graduate Advisor (Ms. Cline) for preliminary format review.

G. THESIS FINAL EXAMINATION (DEFENSE) – The final examination schedule is arranged by the student and processed through the Graduate Office, ARMS 2315. The final examination should be SCHEDULED at least two weeks prior to the examination date. Specific final examination and filing date deadlines exist within the University for each academic term. Deadlines for the Graduate School requirements can be located at: http://www.gradschool.purdue.edu/thesis.cfm, as well as on the School of Materials Engineering website.

At least two weeks before the final examination, the candidate must submit the Graduate School Form 8 (Request for Appointment of Examining Committee), which lists the names of the members of the Examining Committee (normally the Advisory Committee). This form must be signed by the candidate’s Major Professor. The date, location, time, and topic of the defense seminar shall be publicized within the School at least seven days before the examination is held so that all graduate students and faculty will have an opportunity to
attend. The format and procedure for the M.S. and Ph.D final examination are detailed in Sections V and VI, respectively.

H. THESIS SUBMISSION – Detailed guidelines on thesis submission, including tutorials and checklists, should be consulted at: http://www.gradschool.purdue.edu/thesis.cfm. An outline of the process is as follows: At approximately the same time that the final examination is scheduled, a date should be arranged with the University Thesis Deposit Office (496-3157) for final review and approval (deposit) appointment. After approval of the thesis by the Examining Committee (all committee members have signed the thesis) the candidate shall submit to the Thesis Office the final “deposit copy” via Electronic Thesis Deposit (ETD) at least one business day (24 hours) prior to the final deposit appointment. At the same time, the following Graduate School forms need to be completed by the candidate:

(i) Form 9 (Thesis/Dissertation Acceptance), signed by the Major Professor, the Chair of the Examining Committee and the Department Thesis Format Advisor (Ms. Vicki Cline)
(ii) Form 14 (Addendum to UMI Doctoral Dissertation Agreement Form) OR Form 19 (Master’s Thesis Agreement) filled out and signed by the candidate.
(iii) Form 20 (Research Integrity and Copyright Disclaimer), required for both M.S. and Ph.D., signed by the candidate.

Upon acceptance of the final deposit copy to the Thesis Office, you will be issued a Thesis Deposit Receipt, which is to be delivered to the Graduate School.

V. MASTER’S DEGREE PROGRAMS

A. OVERVIEW - The master's programs are designed to guide the students to expand their knowledge base in the field through course work and self study and to develop analytical and/or experimental skills through a research/design experience. Options of thesis or non-thesis are open, depending on the student's professional goals. The School assures financial support for a minimum of one year; there is no option for a coursework-only degree through the School. Off-campus students may take a Master of Science in Engineering degree by distance education through the Engineering Professional Education (ProEd) division of Purdue University.

B. M.S. THESIS OPTION - The thesis option (course number MSE 698) requires a minimum 18 credits of coursework (~six courses) and an acceptable thesis based on independent research under the guidance of a major professor. The student is aided by an advisory committee in formulating a plan of study including coursework, research and teaching experience. All thesis option students are required to teach at least once during their academic program. The thesis is expected to meet the high standards of a technical publication and the format requirements of the University. At the end of the program, the thesis is defended by the student in an oral examination and must be acceptable to the examining committee with regard to both its technical format and contents.

The Master’s thesis final examination in the School of Materials Engineering normally shall consist of two parts occurring consecutively. The first part shall be a public presentation and defense of the thesis work of twenty to thirty minutes, followed by open question time. The
general format shall follow that of the School seminar. The second part shall consist of an
oral examination of the candidate by the Examining Committee and will be attended only by
the Committee and the candidate. Based upon their opinions formed at the end of this
examination, the Committee will recommend (or not recommend) the candidate for the
appropriate Master’s degree and may also recommend (or not recommend) him or her for
continued study toward the Ph.D. Recommendation for the degree may be contingent upon
further work and/or modification of the thesis document. See Section IV for details of M.S.
thesis preparation, final examination, and submission procedures.

C. NON-THESIS M.S. OPTION - The non-thesis option (enrolled as course number MSE 697)
requires 30 credits of coursework, 6 of which must be earned through a project-oriented
study under the guidance of a professor acting as advisor. The project is limited in scope
and may be related to specific problems dealing with material selection, processing, design
or performance in engineering applications. At the end of the project, the student prepares
a technical report and defends it in an oral examination. The format, number of copies, and
general requirements of the report will be specified by the major professor. Typing and
duplication is the responsibility of the student. A “Certification Page” for the Graduate
Office copy is available in the Graduate Office, ARMS 2315. The report should be
distributed to the final Examination Committee at least one week prior to the examination.

The non-thesis option would be especially appropriate to industrial personnel who seek an
M.S. degree on a part-time basis.

D. M.S. PROGRAM DURATION - No minimum residency requirement exists for the M.S.
program. No student will be permitted to register for the Master’s beyond two years without
the prior review and approval of the Graduate Committee.

E. M.S. DEGREE TITLE - One of three types of Master’s degrees may be earned through
advanced study in the Materials Engineering graduate program: the Master of Science
degree for those whose undergraduate degree was in the physical sciences or mathematics
rather than in engineering, the Master of Science in Material Science Engineering degree
for those whose undergraduate degree was in the same field (i.e. materials, metallurgy or
ceramics) and the Master of Science in Engineering degree for those whose undergraduate
degree was in an engineering field other than in materials.

F. M.S. BYPASS - Students in the MS program may petition the Graduate Committee to bypass
the MS Degree and pursue a Ph.D. The student should supply a letter to the Graduate
Committee Chair with a clear indication of the request to "Petition to Bypass the MS Degree"
subject to all conditions of the PhD program. A short description of the proposed doctoral
project should be included and the student’s major professor should also sign the letter. If
approved by the Graduate Committee, the student should file a Ph.D. plan of study and will
be on a normal course for PhD studies.

VI. DOCTOR OF PHILOSOPHY PROGRAM

A. GUIDELINES FOR Ph.D. PLAN OF STUDY - There are no formal course requirements or
any minimum number of required course credit hours, although a Ph.D. plan of study will
normally include 30 credit hours of course work. The plan of study for the Ph.D. may
incorporate course work taken previously for the M.S. degree, as well as up to 6 credit hours of 300- or 400-level Materials Engineering courses to be taken in order to provide the background needed for advanced study in Materials Engineering. All Ph.D. students must be prepared to demonstrate competence by course credits, self-study and examination, etc., in mathematics and basic sciences, in materials processing, materials structure and materials properties, as well as in undergraduate course prerequisites to the advanced and graduate level courses in the primary area of the plan of study. All Ph.D. students are expected to gain teaching experience (or equivalent). At least two semesters engaged in teaching is expected of all Ph.D. students.

The primary area of the plan of study must provide an appropriate balance of breadth and depth of advanced course study in the major area of Materials Engineering, which includes the area of thesis research. Courses in related areas or “minors” often will be selected from other branches of science or engineering related to the research objective.

It is expected that the course work of the plan of study will be substantially completed at the time of the Preliminary Examination, and that this examination may include questions based on this plan and on any part of the course work background of the student as both relate to the Preliminary Examination.

B. ADMISSION TO CANDIDACY FOR THE Ph.D. DEGREE - is based on satisfactory completion of the Ph.D. Preliminary Examination taken by the student.

C. PRELIMINARY EXAMINATION PROCEDURES

1. **Objective** - The objective of the Ph.D. preliminary examination is to determine whether or not the student qualifies for admission to candidacy for the Ph.D. degree. This suitability is determined by demonstrating the following abilities:

   - **Knowledge** – ability to show general Materials Engineering knowledge and deep knowledge of their chosen topic.
   - **Analysis** - ability to understand and analyze scientific and engineering concepts and data, to place them in context, and to show how MSE knowledge and classwork relates to their topic
   - **Creativity** - ability to synthesize new ideas to develop and test hypotheses, identify and probe deficiencies, and determine and propose new pathways of research
   - **Reasoning** – ability to reason through problems using knowledge, analysis, and creativity
   - **Research** - ability to conceptualize, plan, and perform original independent research

2. **Prerequisite** – Students must pass the MSE General Exam before they are allowed to take the Preliminary Examination. Students not meeting this requirement cannot take the Preliminary Examination, but may be allowed (at the advisor’s discretion) to retake the MSE General Exam, where successfully meeting this requirement will then allow the student to take the Preliminary Examination. Students are allowed to take the MSE
General Exam no more than two times. The MSE General Exam is a comprehensive exam at the level of the general undergraduate MSE texts (e.g., Callister) and MSE 600 Fundamentals of Materials Engineering should be seen as a good preparatory course. The MSE General Exam is nominally given during finals week of the Fall semester and administered by the faculty instructor of MSE 600, although it may be scheduled at other times, such as finals week of the Spring semester (nominally also by the instructor of MSE 600 for that year). Students with a strong background in MSE may consider taking the MSE General Exam earlier. The Preliminary Exam should be performed as soon as the student is ready, but no later than the next preferred testing period of Finals Week in the Fall Semester, contingent upon scheduling.

3. **Critical Review and Seminar** - In consultation with her/his Dissertation Advisor and Advisory Committee, the Ph.D. student selects a subject area on which to write an original critical review paper and present a seminar. The subject area may be related to a phenomenon, a process, an analytical technique, or a problem in design, development, or research, as encountered in the broad field of materials science and engineering. However, the topic must be related to the dissertation research, and the student is expected to know and understand the topic background, seminal works and/or current hypotheses on the topic at a high level. The paper must not simply review the literature, but must also demonstrate the abilities described in the Objectives above.

The student is to prepare a 4000-word technical write-up that presents an original critical review of background, seminal works, and/or hypotheses of the student’s research topic or one or more aspects of the topic, and specifically in depth, not simply an overview. The document should include an additional one page or less of preliminary results (if any) and an additional one page of future plans for dissertation research with specific directions/experiments to perform. The topic, focus and format of the critical review should be discussed with the advisor and must be approved by the advisor in writing on the cover sheet before submission to the examination committee. A citation method common to the student’s field should be used, but must include all authors, title, source, year, and page numbers. Figures should also be cited and state clearly if it is based on literature or if the figure is reproduced from literature.

The Preliminary Examination (Evaluation) Committee will consist of four members of the student’s Dissertation Advisory Committee and be chaired by a member other than the dissertation advisor(s). If the Dissertation Advisory Committee has more than 4 members, then the most appropriate four will be chosen.

By November 15 of the second year of PhD studies, copies of the Preliminary Examination document are to be submitted by the student to the Examination Committee, the designated plagiarism faculty, and the Graduate Committee secretary, along with a cover memo signed by the advisor certifying that the advisor has reviewed the document and attests that the format and topic are acceptable. Failure to meet this time-limit may constitute failure of the preliminary examination. If required by the committee members, students must provide electronic copies of articles, papers etc (on CD, flash, or other media). The seminar and exam is ideally scheduled on the same day in consecutive time slots during finals week of the Fall semester (nominally, the first week of December). However, if consecutive slots are not available, non-consecutive is allowed. Additionally, if finals week is not possible due to scheduling conflicts, the
student should schedule the Preliminary Examination as close to this time as possible (e.g. the week prior or after). This timing is not meant to preclude earlier completion, but is rather the desired limit. In any case, this examination requires two weeks prior notice to the Graduate School. The student is responsible for arranging the time of the seminar and oral examination with her/his Advisory (Evaluation) Committee. The time, location, and topic for the seminar shall be publicized within the school at least a week prior to the scheduled date so that all faculty and graduate students will have the opportunity to attend. Students should make all efforts to establish the day and time as early as possible to ensure room availability.

The designated plagiarism faculty will check the document for plagiarism, and if such is found, will be forwarded to the examination committee and may constitute failure of the Preliminary Exam.

The student presents the open technical seminar with appropriate emphasis on the scientific principles, phenomenological basis, experimental methods, hypotheses, and criteria for applications essential for a clear and analytical presentation of the subject area. The student is expected to answer questions from the faculty and the graduate students. The duration for the seminar including questions and answers should not exceed 50 minutes. The seminar presentation should last 30–35 minutes.

4. **Subject Area (Oral) Examination** - Oral examination by the Evaluation Committee normally takes place immediately following the seminar and as such the student and committee should plan on 3 hours – 1 hour for seminar and 2 hours for oral exam. However, non-consecutive slots are allowed as schedules dictate. The exam explores the student’s understanding of basic concepts and principles in several areas of Materials Science and Engineering as they relate to the preliminary exam topic, including the seminar presentation, critical review paper and the course work background of the student as all relate to the preliminary exam topic and its background. In such a way, MSE600 or classwork can be questioned if it related to the preliminary exam topic. The Evaluation Committee seeks to assess not only factual knowledge but also the student’s ability to communicate in technical terms, and to integrate ideas learned through course work and self-study pertinent to the Preliminary Examination subject area.

At the start of the oral examination, the student will receive the starting written examination questions and have 30 minutes before committee members enter the room to administer the exam. During this time, the student can use any non-digital preparation materials they feel are necessary. Each examiner will have 15 minutes to administer their own question without interruption by other members. After all 4 members have given their question, each member will be given an additional 5 minutes to ask follow-up questions about their own or other questions, or any other relevant topic.

5. **Results of the Preliminary Examination** - On the basis of the critical review paper, presentation and oral examination, the Evaluation Committee will recommend to the Graduate School one of three options:

   i. Recommendation for admission to Ph.D. candidacy.
ii. Re-examination no later than within the following semester.

iii. That the student be withdrawn from the Ph.D. program.

If the report is favorable, the student will be formally reclassified as a candidate for the degree of Doctor of Philosophy. Along with recommendation for candidacy the Evaluation Committee can specify any possible areas of weakness that need further development with regards to classwork, teaching or self-study.

It should be noted that progression to candidacy does not confer automatic progression as a PhD student to the PhD Final Defense – PhD candidates must maintain satisfactory research progress, minimum GPA, and all rules and conditions that normally apply. As is normally the case, two Unsatisfactory (U) grades in research may be cause for removal from the program.

6. **Time Schedule** – The table below provides an outline of the Preliminary Exam process and associated deadlines.

<table>
<thead>
<tr>
<th>Preliminary Exam Process Steps</th>
<th>Timing*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passing MSE General Exam</td>
<td>Normally Fall Finals week of 1st year.</td>
</tr>
<tr>
<td>Discuss Preliminary Exam topic and format with dissertation advisor</td>
<td>Suggested summer of 1st year</td>
</tr>
<tr>
<td>Have dissertation advisor attestation to format and topic and signature</td>
<td>Suggested Nov 1st-15th of 2nd year</td>
</tr>
<tr>
<td>Submit copies of Preliminary examination to dissertation/examining committee, Designated Plagiarism Faculty and Graduate Committee Secretary</td>
<td>Deadline of Nov 15th of 2nd year</td>
</tr>
<tr>
<td>Complete public seminar presentation and oral exam.</td>
<td>Normally Fall Finals week of 2nd year on the same day in consecutive time slots</td>
</tr>
<tr>
<td>Have Research Review with dissertation committee</td>
<td>Approximately 1 year before final defense.</td>
</tr>
<tr>
<td>Defend dissertation</td>
<td>At least two full semesters (of registration) must elapse between Preliminary Exam and the Final Defense.</td>
</tr>
</tbody>
</table>

* Failure to meet the Preliminary Examination deadlines may result in automatic failure of the candidacy exam. Failure to meet other deadlines may result in the student receiving an Unsatisfactory (U) grade for MSE 699. Two Unsatisfactory grades will result in an automatic review by the Graduate School and possible withdrawal of the student from the Ph.D. program.

D. **RESEARCH REVIEW** – Approximately one year, but at least two full semesters, before the final defense, the student shall meet with the Dissertation Advisory Committee to assess progress in the Ph.D. thesis research. A dissertation progress report, proposal for completing the dissertation research, and timeline is prepared by the student and distributed to the Advisory Committee at least a week prior to the oral review. The report and proposal are
presented to the Advisory Committee and defended by the student. The student should look upon this review as an opportunity for an in-depth discussion of the progress of the thesis research, be able to demonstrate the current state of knowledge in his/her research area and allow the committee to provide feedback and raise concerns about issues related to the dissertation. The exact format, length, and content will be decided upon in conjunction with the dissertation advisor(s).

E. **PhD FINAL EXAMINATION** - It is a University requirement that at least two full terms (i.e., grad/staff report date to end of finals week) in residence at Purdue must elapse and be devoted to research between the Preliminary and Final (Defense) Examinations. See Section IV for details of Ph.D. thesis preparation, submission and Final Examination procedures. The Ph.D. Final Examination in the School of Materials Engineering normally shall consist of two parts occurring consecutively. The first part shall be a public presentation and defense of the thesis work of thirty to forty minutes, followed by open question time, in which the candidate demonstrates to the Committee the capabilities for which the Ph.D. is awarded. The general format shall follow that of the School seminar. The second part shall consist of an oral examination of the candidate by the Advisory Committee and will be attended only by the Committee and the candidate. Based upon their opinions formed at the end of this examination, the Committee will recommend (or not recommend) the candidate for the Ph.D. degree. Recommendation for the degree may be contingent upon further work and/or modification of the thesis document.

F. **GRADUATE COURSES IN MATERIALS ENGINEERING** - to aid students in preparing their plans of study, the following list of courses grouped by subject area is provided, but is not inclusive of all courses. Courses outside of MSE are allowed. 600 level courses should be taken when possible. A maximum of two lower division 300 and 400 level courses may be taken, although this is not preferred and should be out of department.

**Mechanics**
- 555 Deformation Mechanisms
- 556 Fracture of Solids
- 557 Deformation Processing
- 597F Dynamic Mechanical Properties

**Thermodynamics & Kinetics**
- 508 Phase Transformations
- 522 Rate Phenomena in Process Metallurgy
- 575 Transport Phenomena in Solids
- 559 Phase Equilibria in Multicomponent Systems
- 560 Production of Inorganic Materials
- 576 Corrosion
- 597K Kinetics of Materials
- 697D Diffusion in Multicomponent Systems
- 697I Interfaces in Materials
Analysis
510 Microstructural Characterization Techniques
531 Quantitative Analysis of Microstructure
597 SEM, EDS, TEM Training Courses (do not count toward graduation)
597C Composites Lab
597A Archeology and Materials Science
630 Diffraction
640 TEM and Crystal Defects

Processing
508 Phase Transformations
512 Powder Processing
522 Rate Phenomena in Process Metallurgy
536 Solidification of Castings
548 Deposition Processing
557 Deformation Processing
597B Composites Manufacturing
597Y Polymer Synthesis
597S Steels: Processing and Properties
650 Optimization in Materials Processing
697T Nanofabrication

Physical Properties
502 Defects in Solids
523 Physical Ceramics
525 Structure-Property Relationships of Engineering Polymers
550 Properties of Solids
597E Energy Conversion Materials
579GM Introduction to Materials Science of Rechargeable Batteries
597M Biomaterials
597N Physical Properties of Crystals
597Z Soft Materials
697X Electromechanical Properties
697C Materials Issues in Microelectronics and Nanoelectronics

Modeling of Materials and Processes*
505 Modeling and Simulation of Materials Processing
597G Modeling and Simulation of Materials
597I Introduction to Computational Materials Science

* An unique aspect of Purdue is the Network for Computational Nanotechnology and its science portal the nanoHUB (www.nanohub.org). The nanoHUB is a gateway for online research, education and collaboration; there you can find lectures on a variety of topics including materials (some by our faculty: Prof. Garcia and Prof. Strachan) as well as simulation tools.
that enable users to run live simulations simply using a web-browser. For example, the nanoMATERIALS simulation toolkit
(http://www.nanohub.org/simulation_tools/matsimtk_tool_information) enables atomic-level materials simulations.