

GRADUATE STUDENT INFORMATION MANUAL

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 temporary academic advisor until the student has a major professor. The student's major professor chairs their 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 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 regularly.

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 main office, if needed. Messages received through the Main Office number, 765-494-4100, (internal extension 4-4100) will be put in your mailbox or otherwise transmitted. Personal calls should be taken on your personal phone.
- 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, offices, laboratories and research space necessary for your work will be authorized by your major professor.
- F. DESK assignments are made at the beginning of the fall semester. Due to limited space, some sharing of desk space or 'hot desking' may be necessary. In addition to Armstrong Hall (ARMS) and the Materials Science and Electrical Engineering building (MSEE), student desks and/or research laboratories are located in the Wang building (WANG), Birck Nanotechnology Center (BNC), Discovery Learning Research Center (DLRC), the Kepner building in Lafayette and the Indiana Manufacturing Institute (IMI) in the Purdue Research Park.
- G. LABORATORIES in ARMS and some other labs are on card/code access. Access to all Materials Engineering laboratories, in ARMS or elsewhere, requires formal safety training and certification. The Chair of the Safety Committee will supply details about the training schedule and the requirements for certification during orientation week.
- H. LEAVE FROM CAMPUS FORMS, available in the Business Office, ARMS 2201, must be completed and approved by your advisor **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. 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. Vacation forms are available in the Business Office, ARMS 2201.

III. APPOINTMENT 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 (RA) appointments, which consists of salary, tuition, the majority of fees and health insurance supplement. 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.

In addition to any financial appointment, students will be registered in each semester for **MSE 69900 Research PhD Thesis** (MSE 69800 for MS students) and will be evaluated on their progress towards thesis objectives by the grade they receive for this course from their advisor(s).

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. This process begins during orientation week and typically culminates by October 1. The PhD Advisory Committee, consisting of the major professor as chair and at least three other faculty members (two others for an MS) selected by the student and major professor, will assist the student in the program.
- B. LANGUAGE REQUIREMENT – Non-native English-speaking students must be certified for oral English proficiency before they can serve as a graduate instructor (Section IV. F). A student may be certified in oral English proficiency by any one of the following:
- A score of 8.0 on the IELTS
 - A score of at least 27 on the speaking portion of the TOEFL
 - A score of 50 or above on Purdue’s Oral English Proficiency Test (OEPT)
 - 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. Coursework requirements for the specific degree programs are listed below. Current lists of MSE courses are maintained on the School website, including a list of recommended foundational course. The plan of study is prepared and submitted electronically to the Graduate School for approval. The plan of study must be approved in the second semester of study, before the student will be allowed to register for the third semester.
- D. EXAMS – Ph.D. students are required to take the Ph.D. Preliminary Exam, as detailed in Section VI. The Ph.D. Preliminary Exam takes place by the end of the Fall semester of the second year or equivalent (end of fourth semester, counting summer). Eligibility for the Ph.D. Preliminary Exam requires first passing the MSE General Exam, which is a comprehensive written exam administered as the final exam of **MSE 69700 Fundamentals of Materials Engineering** offered each fall semester. Although this course is not required, it is strongly recommended for all MSE graduate students.
- E. 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. First-year MSE graduate students must complete an online training module, “Responsible Conduct of Research for Physical Sciences” from the Collaborative Institutional Training Initiative (CITI). The graduate seminar will provide opportunities to explore specific topics in ethics in research. Students should actively engage in discussion of research ethics with their fellow students and research advisors.

- F. MATERIALS ENGINEERING TEACHING EXPERIENCE (METE) – Developing teaching ability is a valuable part of graduate education, regardless of career path. To this end, all Ph.D. students will serve at least one semester as a graduate instructor under faculty direction as part of their degree program. During the semester that 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 courses 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 the semester when teaching, appointments will be adjusted to include a ¼-time Teaching Assistantship (with the exception of students supported on a fellowship), with a corresponding reduction in any Research Assistantship. Some opportunities for additional teaching experience on a voluntary basis may be available.
- G. ANNUAL PROGRESS REVIEWS – Early in each calendar year all students are expected to file a report of their progress in the previous calendar year on a form developed by the School. The student and advisor(s) then meet to discuss the student’s self-assessment, the advisor’s evaluation and feedback, and plans for the student’s research, coursework and possibly teaching in the coming year. First-year students should also use this meeting to discuss their plan of study (coursework plan and advisory committee selection).
- H. 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 Advisory 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 Office for preliminary format review.
- I. THESIS FINAL EXAMINATION (DEFENSE) – The final examination schedule is arranged by the student and processed through the Graduate Office, ARMS 2315. *The Graduate School requires final examinations to 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; May, August or December graduation dates are the possibilities. 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 three weeks before the final examination, the candidate must provide the Materials Engineering Graduate Office with the date and time of their defense as arranged with their committee. Submit the necessary information to complete the Graduate School Form 8 (Request for Appointment of Examining Committee), which also lists the names of the members of the Examining Committee (normally the Advisory Committee). As soon as the date, time and location of the defense are established, the candidate must provide this information, together with an abstract of the seminar, to the Graduate Secretary, for publicizing it 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.

- J. **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 Engineering Professional Education (distance education) division of Purdue University also offers an Interdisciplinary M.S. degree option with a concentration in Materials Engineering.
- B. **M.S. THESIS OPTION** - The thesis option requires a minimum of 18 credits of coursework (typically 6 courses), 30 credits total of coursework and research (as **MSE 69800 Research MS Thesis**), and an acceptable thesis based on independent research under the guidance of a major professor. The student is aided by an advisory committee of three faculty members, including the advisor(s), in formulating a plan of study. 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 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 thesis preparation, final examination, and submission procedures.

- C. **NON-THESIS M.S. OPTION** - The non-thesis option requires 30 credits of coursework, 6 of which must be earned through a project-oriented study (**MSE 59700**) 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, for which the format and general requirements are specified by the advisor. A copy of the approved report should be file with the Graduate Office.

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. BYPASS** - Students in the M.S. program, with approval of their advisor(s), may petition the Graduate Committee to bypass the M.S. Degree and pursue a Ph.D. directly before the end of their third semester (including summer). The student should supply a letter to the Graduate Committee Chair with a clear indication of the request to "Petition to Bypass the M.S. Degree" subject to all conditions of the Ph.D. 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 Ph.D. 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 typically include about 30 credit hours of course work. At least 90 credit hours total is required for the Ph.D., with the balance of any course work being research credit hours (**MSE 69900**). The plan of study for the Ph.D. may incorporate course work taken previously for an M.S. degree; up to 18 credit hours of coursework that is directly applicable to the Ph.D. plan of study, as determined by the student's advisor, can be included. A total of 30 credit hours, including research credit hours, from an earned M.S. degree can be applied toward the Ph.D. 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. 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 (qualifying) Exam before they are allowed to take the Ph.D. Preliminary Examination. Students not passing the General Exam in their first attempt may be allowed (at the advisor’s discretion) to retake the General Exam in the following summer; no more than two attempts are allowed. The MSE General Exam is a comprehensive exam at the level of the general undergraduate MSE textbooks (e.g., Callister). It is administered as the final exam of **MSE 69700 Fundamentals of Materials Engineering**, which should be seen as a good preparatory course. After passing the MSE General Exam 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 section 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 is 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 Ph.D. 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 for the Exam Committee.

By November 15 (April 15 for students starting in the spring semester) of the second year of Ph.D. studies, copies of the Preliminary Examination document are to be submitted by the student to the Examination Committee, the designated plagiarism check faculty, and the Graduate Committee secretary. The document package must include the standard coversheet checklist available on the website and signed by the advisor certifying that the advisor has reviewed the document and attests that the format and topic are acceptable. The document must also include an abstract suitable for publicizing the seminar. Failure to meet this time-limit may constitute failure of the Preliminary Examination.

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.

Once the document is approved, no further changes can be made to it and the student can then proceed to formally schedule the Preliminary Examination with the Graduate School through the Materials Engineering Graduate Office. The Graduate School requires at least a two-week prior notice in order to schedule a Preliminary Exam. The seminar and exam are 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, the approved document must be provided to each Examination Committee member no less than 2 weeks before the scheduled exam.

The student is responsible for arranging the time of the seminar and oral examination with her/his Advisory (Evaluation) Committee. The date, time, location and an abstract 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 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 coursework background of the student. In such a way, classwork can be questioned if it is 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 questions, 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.

| Preliminary Exam Process Steps | Timing |
|--|---|
| Passing MSE General Exam | Normally fall Finals week of 1 st year |
| File Plan of Study | Deadline spring semester of 1 st year |
| Discuss Preliminary Exam topic and format with dissertation advisor | Suggested summer of 1 st year |
| Have dissertation advisor attestation to format and topic and signature | Suggested Nov 1 st -15 th of 2 nd year |
| Submit copies of Preliminary Examination to dissertation/ examining committee, Designated Plagiarism Faculty and Graduate Committee Secretary (including seminar abstract) | *Deadline of Nov 15 th of 2 nd year |
| Complete public seminar presentation and oral exam. | Normally fall Finals week of 2 nd year on the same day in consecutive time slots |
| Have Research Review with dissertation committee | Approximately 1 year, but at least two full semesters, before final defense. |
| Defend dissertation | At least two full semesters (of registration) must elapse between Preliminary Exam and the Final Defense. |

*Failure to meet the Preliminary Examination deadlines (November 15, 5:00 PM) will result in automatic failure of the candidacy exam attempt. Failure to meet other deadlines may also result in the student receiving an Unsatisfactory (U) grade for **MSE 69900**. 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 Advisory Committee to assess progress in the Ph.D. thesis research. The student is responsible for arranging the date and time of the review with her/his Advisory Committee and scheduling it through the Materials Engineering Graduate Office. Also referred to as a “Rata Review”, 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, proposal and timeline are presented to the Advisory Committee and defended by the student. The student should also provide to the Committee copies of their publications and substantially completed manuscripts related from the project.

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, content and length will be decided upon in conjunction with the dissertation advisor(s) but typically the student presents for about 45 minutes and the review overall is about 90 minutes and is limited to no more than 2 hours.

- E. **PhD FINAL EXAMINATION** - 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 Advisory 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 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.

The Graduate School requires a finished thesis document to be supplied to the Committee at least 10 working days before the Final Examination. Any member of the Committee can require the examination to be rescheduled if the document, or any changes to the document, are delivered later than this deadline.