

GUIDELINES FOR GRADUATE STUDENTS  
IN METALLURGICAL & MATERIALS ENGINEERING

DEPARTMENT OF METALLURGICAL & MATERIALS ENGINEERING  
THE UNIVERSITY OF ALABAMA

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# 1 Welcome to Metallurgical & Materials Engineering

The following information is designed to guide you (the student) in procedures used by your Department and the Graduate School in completing your graduate degree. This should be regarded as a supplement to, but not a replacement for, the material in the Graduate Catalog. If students have questions concerning the guidelines, they are encouraged to discuss their concerns with their graduate advisor, department head or the department's graduate coordinator. This will ensure all the requirements are being met and each student is making adequate progress towards graduation. Any possible errors in these guidelines do not supersede or can replace those outlined in the Graduate Catalog.

Entering Metallurgical and Materials Engineering (MTE) graduate students are either on the University Scholars, Master's or Ph.D. track degree program. Admission to the Graduate School for earning these degrees does not imply admission of a student to candidacy for a degree. Admission to candidacy is contingent upon the recommendation of the student's department and the approval of the graduate dean, after the student has met the formal requirements for candidacy listed below and demonstrated sufficient preparation to pursue the graduate study and research required for the degree sought. Students in the Materials Science PhD program, with MTE as the home department, should consult the Materials Science PhD guidelines for their academic requirements.

During your first semester, a student, if not done so, should select a graduate advisor. This advisor will assist you in course selection and research topic preparation. If a student has not selected an advisor, advisement will occur under the direction of the department head.

## 2 M.S. Degree Options

Two plans, Type I or II, are offered for earning the Master of Science in Metallurgical and Materials Engineering (M.S. MTE) degrees. Students should work with their supervisory committee in determining which plan will be pursued within the first semester of graduate education enrollment after which a plan of study can be developed to ensure adequate progress is made to achieve the degree's requirement.

Admission to the Graduate School and the earning of a master's degree from The University of Alabama does not guarantee acceptance into a doctoral program.

### 2.1 M.S. Degree Requirements

#### 2.2 M.S. Plan I.

Candidates for the master's degree under Plan I must earn a minimum of **24 semester hours** of credit in coursework and write and orally defend a thesis (a minimum of 6 semester hours of thesis research required, MTE 599). The course level requirements are given below. Plan I is standard practice for earning the master's degree in the Department of Metallurgical & Materials Engineering.

## **Thesis**

The thesis should show evidence of research capacity, independent thought, and the ability to interpret data. The subject chosen must be in the major field and must be approved by the graduate committee of the major department or school and by the head of the student's major department or division.

The thesis should be completed, if possible, while the student is in residence at the University. To request permission to complete a thesis in absentia, the student must, before leaving the University, submit a satisfactory outline of the thesis, as well as evidence that adequate facilities are available where the work will be done, to the head of the student's major department.

The candidate must give members of the examining committee a minimum of two weeks to read the thesis before the date of the final oral examination. A final oral examination is required of all students completing a thesis.

## **Thesis Format**

The University does **not** permit an "article-style thesis" to be presented for a master's degree. Please consult your graduate advisor on details of formatting and presentation of the thesis.

As of August 15, 2009, all thesis are submitted electronically rather than on paper. See the graduate school's homepage for a link to information on **Electronic Theses and Dissertations (ETD)** for details. Theses must comply with the regulations set out in **A Student Guide to Preparing Electronic Theses and Dissertations**, available on the Graduate School's website. Approval of the thesis by the graduate dean is necessary before graduation.

## **2.3 M.S. Plan II.**

Candidates for the master's degree under Plan II must earn a minimum of **30 semester hours** of course work credit and complete a culminating or "capstone experience" as described under the Comprehensive Examinations section. Evaluation of the type of capstone experience exam is determined by your graduate supervisory committee members.

## **Comprehensive Examinations**

In addition to the regular course examinations, a final comprehensive examination representing a "culminating" or "capstone" experience is required of all candidates for the master's degree. The comprehensive examination is a culminating experience in which the student is expected to integrate prior learning. The various exams may consist of one or more of the following, as outlined in the UA graduate catalog:

- a thesis and final oral defense (Plan I);
- a written and/or oral examination based on the content of the degree program;
- a course requiring interpretation and integration of information from previous courses;
- a research paper, a "policy and practice" paper, or equivalent experience;
- a public performance or exhibition along with a contextualizing paper; and/or
- a practicum or internship.

## ***2.4 Master's Degree Supervisory Committee***

A master degree supervisory committee must consist of at least three members appointed by the dean of the Graduate School. The thesis committee chair is normally your advisor. A form for **Appointment or Change of Master's Thesis Committee** is used to request that the graduate dean appoint a thesis committee. The Committee Chair must be a full or associate member of the UA Graduate Faculty. One member must be from outside the student's major department. All members of the thesis committee must be members of the **UA graduate faculty**. If the outside member is not a full or associate member of the UA Graduate Faculty (e.g., a highly qualified person from another university, a business or industry), the thesis committee chair or department head will petition the graduate dean to appoint that member by approving Temporary Graduate Faculty status for the specific purpose of serving on the student's thesis committee. Unless there are extraordinary circumstances meriting approval by the graduate dean before the final oral defense of the thesis, all members of the thesis committee must attend the defense.

## ***2.5 Graduation Timelines***

The examination must be given at least six weeks before the date of graduation and reported promptly to the dean of the Graduate School on appropriate forms. The form should be submitted when all examinations are completed. A student may take the final oral or written examination only twice. Failing the examination twice results in dismissal from the degree program and the Graduate School.

## ***2.6 Master's degree course work requirements:***

Both plan I and II require a minimum of 18 semester hours in the Metallurgical & Materials Engineering courses. With the approval of the major department, the remainder of the coursework may be completed in either the major or a related field. Students should consult their graduate supervisory committee on course selection and the approval process.

Additional requirements as set forth by the MTE Department include the following:

- a). **Transfer of credit.** Please consult the UA Graduate Catalog on requirements. Any course petition from another institution will require the MTE department and Graduate School approval.
- b). **Seminar.** Only 1 hour of MTE 595 (Seminar) can count towards your degree requirement. Students that are on funding through a departmental graduate teaching assistantship (GTA) or externally funded graduate research assistantship (GRA) or fellowship are required to register for MTE 595 each semester they are enrolled in the MTE department. Exceptions due to class conflict are permitted with prior approval of the MTE 595 instructor.
- c). **400-Level Courses.** A maximum of 6 semester hours of 400-level course credit may be accepted for a **master's degree program**, but only if a form for **Approval of 400-Level Course Work for Master's Credit** is approved by the Graduate School prior to the semester in which the 400-level coursework will be taken. To receive graduate credit for such courses, a minimum grade of "B" must be made in courses in the student's major field of study, and a minimum grade of "C" in courses outside the major field.

- d). **Time Limit.** All requirements for the master's degree must be completed during the six (6) years (18 fall, spring, and summer semesters) immediately preceding the date on which the degree is to be awarded. There is no provision for an extension of the time limit beyond 6 years for master's students.
- e). **Math requirement.** At least 3 hours of GES 400 level or higher math courses must be completed for an M.S. degree. Petition of a non-GES 400 level or higher math equivalent course must be approved by a majority vote of the MTE faculty. A GES 400 level course will be counted into the total number of 400-level courses that can be accepted within the degree requirements.
- f). **Admission to Candidacy.** The application for **Admission to Candidacy** for the master's degree should be filed after 12 semester hours of graduate credit have been earned at The University of Alabama. It **must** be approved by the time of registration for the semester in which requirements for the degree are completed. Approval will depend on (a) the quality of the applicant's graduate work prior to the time the application is made (see **Scholastic Requirements**); (b) the removal of any special conditions; and (c) the certification of the major department or school that the student is well qualified to continue work toward a degree.
- g). **MTE core courses:** All students are required to take a common set of three core courses (9 total semester hours) as follows:
  - i. Advanced Mechanical Behavior of Materials MTE 556
  - ii. Metallurgical Thermodynamics MTE 562
  - iii. Advanced Physical Metallurgy MTE 579

## 2.7 University Scholars Program

University of Alabama undergraduate students that meet the eligibility for the University Scholars' Program can complete their Master's with one additional year of full term coursework. Entering (non-UA) graduate students are not offered this option.

The University Scholars' Program includes the following:

- a). Meet the minimum 3.3 GPA requirement for the University Scholars Program as set by the Graduate School;
- b). Be a senior (having completed 91 hours towards the Bachelor of Science (B.S.) MTE or having fewer than 30 hours remaining);
- c). Have completed three quarters of the total hours required for the B.S. MTE degree;
- d). Have completed all of the University core curriculum requirements;
- e). Have submitted an application to the Graduate School.
- f). **MTE core courses:** All University Scholar students are required to take a common set of three core courses (9 total semester hours) as follows to earn a M.S. degree:
  - i. Advanced Mechanical Behavior of Materials MTE 556
  - ii. Metallurgical Thermodynamics MTE 562
  - iii. Advanced Physical Metallurgy MTE 579
- g). Complete the competency examination as outlined in Plan II, and directed in UA's graduate catalog.

Those interested in the University Scholars Program should consult the graduate catalog and the graduate coordinator for further details.

### 3 Ph.D. Degree Requirements

The doctor of philosophy degree is granted on the basis of scholarly proficiency, distinctive achievement in a special field, and capacity for independent, original investigation. The first two criteria are tested in coursework and a comprehensive examination, the last in a dissertation in which the student must present clearly and effectively the results of substantial research. A combination of these accomplishments, rather than the mere accumulation of residence and course credits, is the essential consideration in awarding the Ph.D. degree. Admission to any doctoral program is limited to students whose scholastic records show distinct promise of success in doctoral study. Admission to the Ph.D. program does not guarantee acceptance into a doctoral candidacy program.

The minimum period in which a doctoral degree can be earned is 3 full academic years of graduate study after completion of a baccalaureate degree, although in most disciplines the period is longer. Graduate teaching assistants (GTA) or graduate research assistants (GRA) whose work assignments are 10 hours per week (i.e. the equivalent of 3 semester hours) or more should expect to take more than the minimum period of 3 academic years to earn a doctoral degree.

#### 3.1 *Ph.D. degree course work requirements*

A defined field of specialization is required of all candidates for the doctor of philosophy degree. A minimum of **48 semester hours** of non-dissertation course credit is required. These courses must be at the 500/600-level. **Unlike the M.S. degree which can accept up to two prior approved 400-level courses for the M.S. Degree, this is not an option for the Ph.D. course requirements.** Ph.D.-track students should consult their graduate supervisory committee on courses that are suited to fulfilling their course of study in the department and research specialty. The doctoral course as a whole must be unified, and all its parts must contribute to an organized program of study and research. In addition, a student must complete a minimum of **24 hours of dissertation research (MTE 699)**. Students enrolled in the Ph.D.-track should register for MTE 699. Please consult the UA Graduate Catalog, Graduate Dean, and Graduate School for other university requirements.

Additional requirements set forth by the Graduate School and MTE Department include the following:

- a). **Transfer of credit.** For students entering into the Ph.D. program, a maximum of 24 M.S. course work hours (non-thesis research) in the major or related field area of study can be transferred towards the Ph.D. program's 48 semester hour minimum requirement. This transfer of course hours is subject to approval by the MTE department and the Graduate School.
- b). **Seminar.** Only 1 hour of MTE 695 (Seminar) can count towards your degree requirement. Students that are on a department graduate teaching assistantship (GTA), externally funded graduate research assistantship (GRA), or external fellowship funding are required to

register for MTE 695 each semester they are enrolled in the MTE department. Exceptions due to class conflict are permitted with prior approval of the MTE 695 instructor.

- c). **500- and 600-Level Courses.** At least 48 hours of course work is required at the 500/600 levels.
- d). **MTE 699:** A minimum of 24 hours of MTE 699 dissertation work must be completed for the Ph.D. degree. The amount of dissertation research for which a student enrolls in any given semester should be commensurate with the progress a student is expected to make on the dissertation, as well as reflective of the extent to which University facilities and faculty time are invested in the proposed activities.
- e). **Time Limits.** All requirements for the doctoral degree must be completed within seven (7) years (21 fall, spring, and summer semesters) following admission to the doctoral program
- f). **Math requirement.** At least six (6) hours of GES 500 level or higher math courses must be completed for a Ph.D. degree.
- g). **MTE core courses:** All Ph.D. students are required to take a common set of three core courses (9 total semester hours) as follows:
  - i. Advanced Mechanical Behavior of Materials MTE 556
  - ii. Metallurgical Thermodynamics MTE 562
  - iii. Advanced Physical Metallurgy MTE 579
- h). **Residency requirements.** The intent of the residency requirement is to ensure that doctoral students contribute to and benefit from the complete spectrum of educational, professional, and enrichment opportunities provided at The University of Alabama. Please consult the UA Graduate Catalog for residency requirements.
- i). **Application for Graduation.** Each candidate for a doctoral degree must apply for the degree through myBama no later than the "last day to register or add a course" of the semester or the first term of the summer session in which requirements for the degree are to be completed. That day is published for each semester at the website of the [University Registrar](#). To apply for graduation, the student submits an [Application for Degree](#) at myBama.
- j). **Clearing the Academic Record for Commencement.** At least one week before commencement, the candidate's record must have been cleared for graduation.
- k). **Attendance at Commencement.** A candidate for a doctoral degree must be present at a scheduled commencement to receive the diploma and hood, unless excused in writing by the graduate dean.
- l). **Withholding or Withdrawing an Advanced Degree.** The University of Alabama reserves the right to withhold or withdraw an advanced degree on the recommendation of the graduate faculty.

### ***3.2 Plan of Study***

Early in the graduate program, each Ph.D.-track student must confer with the appropriate departmental adviser or major professor to select courses, plan of study, research direction, any residency requirements will be completed, and so forth. At that time, a Plan of Study must be prepared and submitted to the Graduate School. The [PhD Plan of Study](#) can be found at the Graduate School website. All doctoral students **must** have a completed Plan of Study approved by the Graduate School no later than the semester during which the student will complete 30 semester hours of UA and/or transfer credit toward the doctoral degree. Otherwise, a "hold" may be placed on future registrations. An amended Plan of Study (if needed) must be submitted to the Graduate

School when the student submits an approved form for **Admission to Candidacy for Doctoral Degree**.

### ***3.3 Doctoral Competency Examinations***

The competency examination is required of all candidates for the Doctor of Philosophy Degree. Competency examinations are composed of questions requiring substantive knowledge of experimental and theoretical topics in metallurgical and materials engineering. The examinations will be designed to assess the breadth and depth of the student's knowledge, encourage organization and integration of knowledge, and inform the faculty concerning the student's academic competence.

- a). The competency examination should be taken at least once during the second year of graduate studies for Ph.D.-track students with traditional entering MTE backgrounds (*i.e.* materials or metallurgy undergraduate degree) and after completing the core graduate MTE courses.
- b). The competency examination should be taken, at least once, during third year of graduate studies for Ph.D.-track students with non-traditional entering MTE backgrounds (*e.g.*, chemistry, physics, mechanical engineering, chemical engineering, etc.) and after completing the core graduate MTE courses.
- c). *No more than two attempts are allowed to pass the competency examination.* If a student does not pass a section, a second and final attempt must be taken at the next available semester the examination is offered. Failure to pass the examination after two attempts does not allow the student to continue within the Ph.D. program in the department or the Graduate School. A student can, if eligible, conclude their graduate education by completing an M.S. degree if they satisfy all the M.S. degree requirements in the UA graduate catalog and MTE department guidelines.
- d). The Metallurgical & Materials Engineering competency examinations consist of the following:
  - i. A written "Fundamental" examination based on the topics below. This exam is normally six hours in duration (a one day examination).
  - ii. Students that earn 70% or greater on a particular section receive a pass and no oral examination is required for that particular section. Each written exam is graded in its entirety by at least two faculty members using an agreed upon key and point system. The scores are averaged for determining the overall percentage.
  - iii. If a student receives less than 70% on a particular section, the student is eligible for an oral examination on the concepts which were missed. After the oral exam is complete, the students will receive a pass, conditional pass, or failure by a simple majority vote of the examination committee. In the event of a tie vote, the student is conditionally passed. A conditional pass may include enrolling and passing specific courses, etc. meant to strengthen the student's concepts of that particular area of metallurgical and materials engineering.
  - iv. The oral examination cannot exceed more than 90 minutes for all sections. The oral examination committee will consist of the faculty mentor, a faculty

member appointed by the mentor, and at least two other members, preferably those that were involved in the failed written exam section(s) (<70%). The committee cannot exceed five (5) total members. The final committee designation is approved by the department head. Appeals are handled through the academic affairs office of the college of engineering.

e). For the Metallurgical & Materials Engineering competency examination, the topic areas are below. A student must take exams (i), (ii), and (iii), which are physical metallurgy, thermodynamics, and mechanical metallurgy. The student then may select either (iv) or (v), materials processing or materials characterization, as the fourth and final examination. Each examination section lasts ninety (90) minutes. The written examination sections consist of a variety of questions including short and long essay answers and mathematical derivations and applications. The written examination is given and completed in one day. The oral examination normally will follow the written examination, with notification given to the student by the graduate coordinator of the oral examination date at least two (2) days before its administration. The topic areas are the following:

- i. Physical Metallurgy: Physical behavior of materials with an emphasis upon metals. Crystallography, martensitic transformations, vacancies, TTT and CCT curves, grain size effects, grain growth, diffusion, recovery and recrystallization, precipitation, nucleation and growth, phase transformations, crystal defects including dislocations, vacancies, etc., interstitial and solid solutions, and liquid/solid reactions. Most of these topics are addressed at an introductory materials science and engineering texts and at a more advanced level in *Physical Metallurgy Principles* by R. Reed-Hill and R. Abbashian.
- ii. Thermodynamics: Theoretical and applied metallurgical/materials thermodynamics. Typical topics for questions include oxidation/reduction, Ellingham/Richardson diagrams, ideal and non-ideal solutions, enthalpies and entropies of reaction, phase diagrams and free energy curves, Clausius/Clapeyron, Nernst equation, and ideal gas behavior. Thermodynamics by N. A. Gokcen and R. G. Reddy and Introduction to Metallurgical Thermodynamics by David R. Gaskell can be used as a reasonable basis for study.
- iii. Mechanical Metallurgy: Testing and properties of materials with an emphasis upon metals. Typical topics for questions include single and polycrystalline deformation, strengthening mechanisms, tensile and compression testing, fracture and fracture toughness testing, microstructural effects on properties, crystallographic effects, dislocations, creep, fatigue, composite materials, and work-hardening. The appropriate chapters from *Deformation and Fracture of Engineering Materials* by Richard W. Hertzberg, *Mechanical Metallurgy* by George Dieter, or *Mechanical Behavior of Materials* by Thomas H. Courtney can be used as a basis for study.

- iv. Materials Processing: Diffusion, heat transfer, fluid flow and solidification phenomena. Typical topics for questions include diffusion mechanisms; Kirkendall effect, diffusion couples, Mantano solutions, Fick's first and second laws, Stoke's law, gas behavior, fluid flow boundary problems, quench rates, solidification science, overview of the principles of solidification processing, the evolution of solidification structure and secondary phases, macro- and micro-segregation, solidification related defects (including hot tears and cracks, macro- and micro-shrinkage, and gas porosities). Diffusion is addressed at an introductory level in materials science and engineering texts and at a more advanced level in *Diffusion in Solids* by Paul Shewmon and *Physical Metallurgy Principles* by R. Reed-Hill and R. Abbashian. Abridged treatments of transport phenomena are given in *An Introduction to Transport Phenomena* by David R. Gaskell and *Transport Phenomena in Metallurgy* by G. H. Geiger and D. R. Poirier. Solidification science and processing aspects are addressed at an introductory level in *Fundamentals of Solidification* by W. Kurz and D. J. Fisher and at more advanced level in *Science and Engineering of Casting Solidification* by D. M. Stefanescu and in *Modeling and Simulation of Microstructure Evolution in Solidifying Alloys* by L. Nastac.
  - v. Materials Characterization: Microstructural characterization of materials with an emphasis upon metals. Typical topics for questions include x-ray spectroscopy, optical and scanning electron microscopy, stereographic projections, crystallography, basic quantitative metallography, diffraction, thermal analysis, electron/solid interactions, surface analysis techniques, and x-ray scattering. The appropriate chapters from *Materials Characterization*, Volume 10, 9th Edition, Metals Handbooks, form a good basis for studying. The individual topics are addressed considerably more detail in various texts.
- f). The competency written examination will be offered the first Tuesday following Fall Break in the Fall semester and the first Tuesday following Spring Break in the Spring semester. If the examination is not to be held at this date, the students will be informed of the rescheduled date of the examination by the graduate coordinator with at least 30 days of advanced warning.

### **3.4 Dissertation Proposal Defense**

After a student has successfully passed the Ph.D. examinations, the student, with the graduate advisor, will assemble a supervisory or dissertation committee consisting of at least five total members (see Dissertation Committee below). The student will present a research proposal that integrates the graduate course work and demonstrates scholarly proficiency, and capacity for independent, original investigation in their specialized field of research. The research proposal should include a one-page abstract summary, no more than fifteen (15) pages of technical content. The technical content should include the integration of prior, referenced literature to the proposed research which demonstrates adequate understanding of doctoral level research. This proposal

should provide the basis for the dissertation. The proposal should include curriculum vitae of the student, budget and budget justification for the doctoral research project. These latter documents and the list of references are not included in the 15 page limit. The proposal should be given to your supervisory committee no later than two (2) weeks before a commonly agreed date where the student will answer questions related to course work and the research proposal provided.

The written research proposal will be presented and orally defended to the supervisory committee. This committee will evaluate the merit of the research proposal and oral presentation and provide constructive input for the research.

The proposal examination should be completed within three academic semesters of passing the Ph.D. examination and at least one academic term before the Ph.D. dissertation defense. See the UA graduate catalog for further details and required forms.

See the UA graduate catalog for further details and required forms.

### ***3.5 Ph.D. Dissertation Committee***

A dissertation committee, with the director of the dissertation as its chairperson, supervises the preparation of the dissertation. The committee shall have not fewer than five members, all of whom are appointed by the dean of the Graduate School and is normally the proposal committee previously assembled. All members of a dissertation committee must be members of the UA Graduate Faculty. One member of the dissertation committee must be from the University of Alabama-Birmingham Materials Science & Engineering Department graduate faculty, which satisfies the joint-PhD degree program between the two departments. The committee chair must be a full member of the Graduate Faculty, as described in the Catalog's section on **Qualifications of the Graduate Faculty**.

One other member must be from outside the student's major department. If the outside member is not a full or associate member of the UA Graduate Faculty (e.g., a highly qualified person from another university, a business or industry), the dissertation chair or head of the department will petition the graduate dean to appoint that member by approving Temporary Graduate Faculty status for the specific purpose of serving on the student's dissertation committee. Unless there are extraordinary circumstances meriting approval by the graduate dean before the final oral defense of the dissertation, all members of the dissertation committee must attend the defense of the dissertation.

The graduate dean's approval of the proposed dissertation committee is expected to be obtained before significant progress is made on the dissertation--typically just before or just after the dissertation proposal meeting. For this purpose, the student submits the form for **Appointment/Change of a Doctoral Dissertation Committee**.

### ***3.6 Admission to Candidacy***

Successful completion and passing of the Ph.D. competency examination and proposal defense transfers a Ph.D. student to a Ph.D. candidate, and the student is admitted to candidacy for the

doctoral degree. The **Admission to Candidacy for the Doctoral Degree** form is submitted to the Graduate School.

### **3.7 The Dissertation**

A dissertation showing the ability to conduct independent research and skill in organization, writing and presentation must be prepared on a topic in the major field. It must constitute an original contribution to knowledge. The subject of the dissertation must be approved by the dissertation committee and by the dean of the Graduate School. The dissertation committee must be approved by the Graduate Dean, and any later changes to the committee also require Graduate School approval. See the “Forms” section of the Graduate School’s website for the Application for Admission to Candidacy ([http://www.graduate.ua.edu/academics/forms/candidacy\\_doc.pdf](http://www.graduate.ua.edu/academics/forms/candidacy_doc.pdf)).

#### **3.7.1 Ph.D. dissertation format**

The dissertation must comply with the regulations in **A Student Guide to Preparing Electronic Theses and Dissertations**. Graduate School deadlines, including each semester's **dissertation deadline**, are available at the **Graduate School's homepage**. Consult the **ETD website** for details of ETD submission, including information on what needs to be submitted to the Graduate School. The graduate dean must approve the dissertation before the student can be cleared for graduation. The Catalog section on Continuous Dissertation Registration for Doctoral Students states that once a student qualifies for doctoral candidacy, the student must enroll each semester for at least 3 hours of dissertation (699) research. If certain conditions are met for the student's final semester, however, the student may qualify to enroll for fewer than 3 hours of 699 dissertation research, but only in that final semester and within the time frame of submitting the required paperwork for graduation that semester. See the UA graduate catalog for details.

#### **3.7.2 Article Style vs. Journal Format**

The decision of the dissertation style is determined by the student’s graduate advisor. Please see the Graduate Catalog for further details.

##### **3.7.2.1 Article Style.**

At the doctoral level, "article-style dissertations" are unified works that include several distinct but related studies of research or creative activity, each of which is of publishable quality. This approach is intended for a doctoral student whose dissertation will consist of a number of related manuscripts or articles, representing independent research or creative activity. Article-style dissertations must be based upon research completed while the student is enrolled at The University of Alabama. For each article used, the student must be the first author, or equivalent, as defined by the discipline.

As with traditional dissertations, the article-style dissertation must be the student's original idea. It must be a unified work and include a sequence of articles of publishable quality around a cohesive theme, with a comprehensive review of literature demonstrating an in-depth understanding of the unifying framework.

- In article-style dissertations there will be introductory material to describe the studies, show how they are related, and explain their significance;
- connecting language to bridge each study to the next; and
- a summary making clear the importance of the studies, integrating the major findings, and discussing the implications for the overall topic.

These components do not have to be separate sections or chapters. They may be parts of the manuscripts or may be accomplished in an abstract.

All parts of both traditional and article-style dissertations must conform to the provisions set forth in **A Student Guide to Preparing Electronic Theses and Dissertations**, except when the circumstances of a specific project or discipline's style manual require deviation. Students considering the article-style approach should contact the Graduate School before beginning their work if they have questions concerning specific problems or deviations from traditional procedure.

All doctoral candidates must give members of the dissertation committee a minimum of two (2) weeks to read the dissertation before the date of the required final oral examination.

**Electronic submission of dissertations:** August 15, 2009, is the date when electronic submission began to be required and paper submission no longer was accepted. Consult the **ETD website** for details of ETD submission, including information on what needs to be submitted to the Graduate School. The graduate dean must approve the dissertation before the student can be cleared for graduation.

### **3.7.2.2 Journal Format.**

A "journal-format dissertation" is acceptable. Such a thesis follows the format of a particular journal in which the student and advisor want the thesis to be published. To prepare a journal-format thesis, the student uses the journal's "information for authors" or similarly titled guidelines in conjunction with the Graduate School's **Student Guide to Preparing Electronic Theses and Dissertations**.

## **3.8 Dissertation Final Examination**

Once the dissertation document is complete, the Ph.D. candidate will provide an oral defense of the document to the supervising graduate committee. This typically entails a 45-60 minute presentation. The dissertation document should be given to the committee with at least two (2) weeks before the mutually agreed oral defense date. The examination of the document and oral defense of the document must be given at least six weeks before the date of graduation and reported promptly to the dean of the Graduate School on appropriate forms. The form should be submitted when all examinations are completed.

**Attendance at Commencement.** A candidate for a doctoral degree must be present at a scheduled commencement to receive the diploma and hood, unless excused in writing by the graduate dean.

## **4 Other Related Graduate Requirements and Information**

### ***4.1 Academic eligibility during graduate school***

Students should consult the UA graduate catalogue on academic eligibility requirements. Students are required to maintain an average of a 3.00 GPA during their progressive to their graduate degree. If a student receives a cumulative GPA below this minimum, they are placed on academic probation for one academic semester. If a student does not achieve a 3.00 GPA the following academic term, the student is dismissed from the department and graduate school, per the guidelines of the UA graduate catalog. Graduate course grades are “A”, “B”, “C”, “D”, “F”. No plus or minus grade scale is used in UA graduate school programs.

### ***4.2 Conditional admission upon entering graduate school***

Some entering graduate students may have conditional admission, which normally refers that their prior GPA to graduate school is below 3.00. These students are eligible for the M.S. program, and if successful in completing a M.S. degree, can apply for enrollment in the Ph.D. program of the department. Student admitted under conditional admission must secure a minimum 3.00 GPA within their first 12 hours of graduate education. Failure to do so results in dismissal from the department and the graduate school, per the guidelines of the UA graduate catalog

### ***4.3 Grievance***

If a student is concerned about the grading and/or decision of the examination or other relevant academic matters, the student can file a grievance for resolution. The details of the process can be located in the UA Graduate Catalog (<http://graduate.ua.edu/catalog/13950.html>).

### ***4.4 Academic Misconduct***

The UA Graduate Catalog defines academic misconduct as “all acts of dishonesty in any work constitute academic misconduct. This includes, but is not limited to, cheating, plagiarism, fabrication of information, misrepresentation, and abetting any of the above. The following definitions of cheating, plagiarism, fabrication of information, and misrepresentation are taken from the UA undergraduate catalog:

*cheating* - using or attempting to use unauthorized materials, information, study aids, etc.

*plagiarism* - representing the words, data, works, ideas, computer program or output, or anything not generated in an authorized fashion, as one's own.

*fabrication* - presenting as genuine any invented or falsified citation or material.

*misrepresentation* - falsifying, altering, or misstating the contents of documents or other materials related to academic matters, including schedules, prerequisites, and transcripts.

Penalties for academic misconduct can range from a reprimand to a penalty as severe as suspension for a definite time or even expulsion. In the event that academic misconduct occurs, The Academic Misconduct Disciplinary Policy will be followed. It is fully outlined in the online Student Handbook linked from the Dean of Students Internet site (<http://www.sa.ua.edu/DoS/>).

#### ***4.5 Protection of Human Subjects for Research***

Scientific research involving human subjects has produced substantial benefits for society, but it also can pose troubling ethical questions. The mission of the University's **Institutional Review Board (IRB)** for Protection of Human Subjects is to ensure that research involving human subjects is conducted ethically. University and federal policies require that review and approval to use human subjects in research precede the research. In the case of thesis research that involves the use of human subjects in any way, the principal investigator is responsible for contacting the college Human Research Review Committee to obtain approval for the planned research. If you are using human subjects in your research, please consult your graduate advisor for specific training and compliance to human subject research.

#### ***4.6 Safety training***

Safety is our utmost concern during your graduate education and research in your individual laboratories. Every individual who works in a lab should complete the basic lab safety course through SkillSoft Academy. To sign up for this course, please ask your advisor to request it, if not done so, or you can request it by visiting UA's Environmental and Health Safety website <http://bama.ua.edu/~ehs/>.

Each laboratory you are assigned to work in should have signage posted outside the door identifying the possible health hazards, including chemical and flammability dangers in the lab. A Materials Safety and Data Sheet (MSDS) of every chemical in the laboratory should also be provided for each lab. This book will give you the protocols of handling any and all chemicals. Please be informed of this information. If your laboratory does not have these items, please see your advisor, the laboratory contact person and/or UA's Environmental and Health Safety (<http://bama.ua.edu/~ehs/>).

You should consult with your graduate advisor and/or supervising committee on other protocols and safety needs for your research. In some of your research, you may be required to complete and pass safety examinations to demonstrate competency in the laboratory. This could include Radiation Safety (for example, if you use X-ray diffraction), laser safety, etc. Please consult UA's Environmental and Health Safety (<http://bama.ua.edu/~ehs/>) for more information and how to take the mandatory exams for such areas.

If you have any questions concerning safety, please contact your advisor, supervisory committee and UA's Environmental and Health Safety.

#### ***4.7 Other resources***

##### **4.7.1 Writing Center:**

To assist you in your writing of technical papers, thesis, and/or dissertations, students can use free-of-charge UA's writing center. This center will be able to help you with grammatical editing, while your advisor and/or supervisory committee can assist you in the technical content editing. Please see UA's writing center website (<http://writingcenter.ua.edu/>) for hours of operation.

### 4.7.2 Fellowships:

Most entering graduate students are either on a Graduate Research Assistantship (GRA). In some cases, students will be given a Graduate Teaching Assistance (GTA) by the home department of the advisor. Please note that students who receive a GTA must qualify for this position by completing and passing the following:

For your information, there are several fellowships you may be eligible for during your graduate education. These are listed below and students are encouraged to talk with their advisor and/or supervisory committee for details. Many of these have specific deadlines for applying and eligibility requirements.

- UA Graduate Council Fellowships - <http://graduate.ua.edu/council/>
- UA McNair Graduate Fellowships - <http://graduate.ua.edu/financial/mcnair.html>
- National Science Foundation Graduate Fellowships – [www.nsf.gov](http://www.nsf.gov)
- NASA Graduate Fellowships - <https://fellowships.nasaprs.com/gsrp/nav/>
- National Defense Science & Engineering Graduate Fellowship - <http://ndseg.asee.org/>
- Department of Energy Graduate Fellowships - <http://scgf.orau.gov/>
- Stewardship Science Graduate Fellowship - <http://www.krellinst.org/ssgf/sitemap>

### 4.7.3 Conference travel grants:

Each academic semester, UA graduate school offers some travel support to offset graduate students cost to present research at a professional meeting or participate in a training meeting. Please consult your graduate advisor for details and eligibility requirements. Please see the following for more details: <http://graduate.ua.edu/financial/researchtravelfund.html>

### 4.7.4 Graduate Teaching Assistantships:

Though the Materials Science Program does not offer Graduate Teaching Assistantships (GTAs), sometimes Materials Science students are supported on home departmental GTAs. For a student to be eligible for a GTA funding, the following instruction is required and must be completed and passed.

Graduate Teaching Assistants workshop. This is held prior to the official start of courses in the fall (only). All graduate students (domestic and international) are required to complete this training to be eligible for a GTA funding line. Registration for the Workshop for New GTAs or the workshop is handled by the department's registering each new GTA registering through the Graduate School website (<http://graduate.ua.edu/gs.thml>). Clerical staff at the home department must register each new GTA; new GTAs do not register themselves.

- International Teaching Assistant Program (ITAP). This workshop is held once a year just prior to the start of the fall academic term. **It is required for all international graduate students who will hold a teaching or lab assistantship** (involving any type of instructional contact with students). ITAP includes the following:
  - those with lab, tutorial, or classroom responsibilities involving any type of instruction, tutoring, or other types of contact with students

- those with instructional contact on a one-to-one, small group, or large group basis;
- those with instructional contact when a senior instructor or professor is present, or
- those with instructional contact when they are teaching or providing help to students in any type of course or lab when a senior instructor or professor is not present.

International graduate students must hold regular or conditional admission to the Graduate School and must have satisfied the minimum TOEFL requirement of iBT 79/pBT 550 or IELTS of 6.5. The ITAP also monitors the progress of ITAP participants after they begin teaching and assists department and graduate assistants with planning teaching assignments. More details can be found at <http://www.eli.ua.edu/statichome/international-teaching-assistant-program/>

**The MTE department will notify each student of the requirement to attend the ITAP and provide them with a copy of the information sheets.** Advisors and students who foresee the need of GTA support must complete this training before an assistantship can be granted; without it, these students will not be eligible for this type of assistantship.

*The Metallurgical & Materials Program wishes you the best in your research and graduate career.  
Roll Tide!*