

Department of
Materials Science & Engineering

Clemson University

GRADUATE STUDENT MANUAL

2017 - 2018

Clemson, SC 29634-0971



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POLICY ON RESEARCH ETHICS

DEPARTMENT OF MATERIALS SCIENCE & ENGINEERING

The effectiveness of the research infrastructure throughout the world is based on the personal and professional integrity of the people involved. The basic assumption that is central to all research endeavors is that researchers have done what they say that they have done. The Department of Materials Science & Engineering is part of that infrastructure, and the research conducted here must withstand the highest scrutiny. Consequently, we must all ensure that our scholarly work is conducted and reported with the highest ethical standards. We must be careful in our record keeping and diligent in our efforts to always attribute credit where it belongs. In particular, we must guard against any activity that would bring the integrity of the department or the individuals within it into question. Among the activities to be avoided are:

- *Falsification of Data* – ranging from fabrication to deceptively selective reporting of results or methods, including the purposeful omission of conflicting data with intent to falsify results;
- *Misappropriation of Other's Ideas* – the unauthorized use of privileged information, however obtained; and
- *Plagiarism* – representation of another's work as one's own. The following website link has a great deal of information in defining and giving examples of plagiarism: www.plagiarism.org. In the Clemson University graduate announcements plagiarism is described “as a form of academic dishonesty that includes copying of language, structure or ideas of another, and attributing the work to ones own efforts.”

Please review the Graduate School's academic integrity policy at:
gradspace.editme.com/AcademicGrievancePolicyandProcedures#integritypol

Note that there is no mention of intent or deceitful intent. This means that if you submit plagiarized work, **even if this is unintentional**, it is still plagiarism. Ignorance of the rules is no excuse for breaking them.

It is the responsibility of every member of Clemson University to enforce the academic policy (see Graduate Announcements).

The following are examples of situations that are considered plagiarism:

- To use ideas (i.e., to steal them) from someone else and pass them off as if the ideas were your own is plagiarism.
- To take a source of material, words, diagrams or results and pass them off as your own is plagiarism.
- To copy someone else's work and submit it as your own is plagiarism.
- To copy words and ideas without giving appropriate credit is plagiarism.
- If you quote someone but do not use quotation marks this is regarded as plagiarism.

- If you change the words in a sentence but do not change the structure this is regarded as plagiarism.
- If you take or copy a vast number of words or sentences or paragraphs from a paper, book, journal or any other literary source so that it makes up a large amount of your work whether you give credit or not is still plagiarism because this goes against United States government guidelines of “fair use”. Basically, if you have copied a text or diagram exactly as in the original source then this is unlikely to be considered fair use. If in some way you have creatively rewritten the material then this more than likely will be considered fair use. However, the more you use or borrow from other sources the less likely it is to be considered fair use.
- Anything directly taken from copyrighted material is plagiarism unless permission is granted to use those materials from the author/publisher.

After reading the above sections and following statement, please sign your acknowledgement:*

The undersigned attests that she/he acknowledges receipt of this manual, has read and understood pages 2 and 3 of the manual, has reviewed the Graduate School's policies on academic integrity, recognizes the importance of maintaining the highest ethical standards in research, and covenants with the other members of the department to conduct his/her research and professional life in a manner consistent with these details.

Printed Name _____

Signature _____

Date _____



* Document collected and maintained by the MSE Program Manager.

STATEMENT OF AGREEMENT*

Department of
Materials Science & Engineering

I, the undersigned, have reviewed the 2017 – 2018 version of the *MSE Graduate Student Manual* and agree to abide by all of the policies, procedures and guidelines discussed herein.

(Printed Name)

(Date)

(Signature)

* Document collected and maintained by the MSE Program Manager.

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INTRODUCTION

WELCOME to the Clemson University Department of Materials Science & Engineering (MSE). This manual is intended to familiarize graduate students and their faculty advisors with the operational aspects of this department. As such, it serves as an informational source and a catalog of departmental procedures and requirements that will affect graduate students. The requirements specified herein are in addition to those described in the “Graduate School Policy Handbook” and the “Graduate School Catalog,” which may be found on the Clemson Graduate School website at <http://www.clemson.edu/graduate/students/policies-procedures/index.html> and <http://www.registrar.clemson.edu/html/catalogGrad.htm>, respectively.

The faculty of MSE has adopted these policies. Since policies can be modified each year, the policies in this manual apply to students joining MSE during the year for which this manual is valid.

All new students are required to attend the orientation sessions held by the Department of Materials Science & Engineering and the Graduate School. Information from these orientations help students to select their specific research areas and will allow them to choose their advisory committee members responsibly. Dates and times of orientation meetings are announced each semester.

We hope this manual is useful both to graduate students and their faculty advisors. Any inconsistencies or omissions should be brought to the attention of the Program Coordinator.

Jurisdiction/Authority

This document is subject to periodic review and revision by the MSE faculty. Each graduate student is subject to the policies in effect at the time of beginning their program. If policies change, a student may petition in writing to both the student coordinator and the chair of the Graduate Standards Committee to change to their graduation requirements to the new policies. This petition will be stored within their file.

QUICK REFERENCE GUIDE- STUDENT CONTACT POINTS

Building Keys:

Administrative Assistant, 161 Serrine Hall

Course Selection (1st semester only, students without research advisor):

Graduate Program Coordinator

Graduate Student Forms:

Program Manager, 162B Serrine Hall

Payroll:

Office Manager, 161 Serrine Hall

Purchasing:

Administrative Assistant (dependent on type of order), 161 Serrine Hall

Student Records:

Program Manager, 162B Serrine Hall

Travel:

Administrative Assistant, 161 Serrine Hall

GRADUATE PROGRAM PERSONNEL

Department Chair, Materials Science & Engineering

Prof. Raj Bordia (161 Surrine Hall, rbordia@clemson.edu)

Department Chair, Materials Science & Engineering – decides matters involving resources available to graduate students; has final approval on assistantship and fellowship offers; is the final authority on regulations and procedures pertinent to the Graduate Program.

Graduate Program Coordinators and Committee

Prof. Kyle Brinkman (206 Olin Hall, 656-1405, ksbrink@clemson.edu)

Chairperson of MSE Graduate Standards Committee – makes recommendations to the Department Chair regarding graduate admission offers along with other members of the Graduate Standards Committee; coordinates graduate student recruitment activities; coordinates Ph.D. comprehensive exams.

Program Assistance

Position Open (162B Surrine Hall, 656-1512,)

Program Manager – manages and maintains student records, coordinates student service program needs for undergraduate and graduate students, and distributes graduate student forms and alerts for meetings, fellowship and job opportunities. Interacts with the Graduate School on other matters including student status, assistantships, and fellowships. Also serves as primary liaison with alumni and industry partners.

Ms. Cheryl Conner (161 Surrine Hall, 656-3187, cconne4@clemson.edu)

Office Manager – assists the Department Chair of MSE with his duties; coordinates fellow administrative assistants, schedules conference room, in charge of payroll

Ms. Tonya Bledsoe (161 Surrine Hall, 656-6900, bledsoe@clemson.edu)

Accountant – manages departmental accounts

Ms. Diane Swope (161 Surrine Hall, 656-5900, dswope@clemson.edu)

Administrative Assistant – distributes keys to Olin Hall and Surrine Hall, travel vouchers, purchase orders/requisitions for general orders and other graduate student financial matters, and Buyways training; receives requests for military leave.

Mr. Bob Bowen (162A Surrine Hall, rlbowen@clemson.edu)

Off-Campus Recruitment Coordinator, The College of Engineering Computing, and Applied Sciences – directs recruitment efforts for undergraduates, recruits off campus regionally for the Department and the College, represents the Department and the College at conferences and conventions.

Technical Assistance

Ms. Kim Ivey (Lab G73 Surrine Hall, 656-5968, ikimber@clemson.edu)

Analytical Lab Manager – manages the daily operation of the MSE Analytical Lab located in G73 Surrine Hall including, daily operation of the Thermal Analysis, Spectroscopy and Chromatography instrumentation. Serves as the instructor for laboratory sections (graduate and undergraduate) utilizing the analytical equipment. Provides research

support for faculty and students utilizing the analytical equipment. Performs outside industrial/contract laboratory analysis.

Dr. Kate Stevens (285 Sarrine Hall, 656-5972, ksteven@clemson.edu)

Technical Services Manager – manages daily operation of Physical Testing Facility. Supervises and schedules daily work of technical staff (Mr. James Lowe, Mr. Stanley Justice, Mr. Paul Rowland and Mr. David White), negotiates and schedules industrial testing/trials in the fabric (nonwoven and woven) formation, fiber extrusion, finishing, and/or Physical Testing Facility. Makes recommendations to the Department Chair regarding laboratory equipment and/or safety, computer, space needs.

Mr. Stanley Justice (Lab B16 Sarrine Hall, 656-5978, jstanley@clemson.edu)

Laboratory Specialist – designs, modifies, and/or installs new or existing equipment to support teaching, research, and public service projects throughout MSE. Supports industrial projects in the fabric (nonwoven and woven) formation and/or finishing labs.

Mr. James Lowe (Lab 280 Sarrine Hall, jaelowe@clemson.edu)

Laboratory Technologist - maintains Chemical Inventory list for MSE laboratories and ensures that all MSE Labs housing Chemicals are meeting Clemson University (CU) Environmental Health and Safety compliance (Sarrine, Olin, Rhodes, & AMRL). Conducts chemical safety training sessions for faculty, staff and students. Carries out external testing in the Physical Testing Facility in addition to training students on the equipment. Supports industrial projects in the fabric (nonwoven and woven) formation and/or finishing labs.

Mr. Paul Rowland (Lab G56 Sarrine Hall, rowlanp@clemson.edu)

Laboratory Specialist – supports research in Sarrine and Olin Halls (Tuesday-Friday) and AMRL (Monday) with respect to maintenance and design of equipment components for research, teaching and public service projects. Supports industrial projects in the fabric (nonwoven and woven) formation and/or finishing labs.

Mr. David White (162C Sarrine Hall, wdavid@clemson.edu)

Systems Programmer – provides Computer and Electronics support to MSE faculty, staff and students (Sarrine, Olin and AMRL). Assists in solving IT problems. Designs electronic circuits for instrument interfacing. Responsible for updating the MSE websites and provides support of industrial projects in the fabric (nonwoven and woven) formation and/or finishing labs.

REGISTRATION

Registration for New Students

Prior to registration for the first semester of study, beginning graduate students must report to the Graduate Program Coordinator. He/she will be their initial academic advisor and will help them plan their initial program of study.

Registration Procedures

The Registrar's Office provides an online guide:
<http://www.registrar.clemson.edu/html/indexRegistration.html>

Enrollment Limits Maximum/Minimum Credit Hours

Student Category	Fall & Spring Semesters	Summer Semester	6-Week Session
Full-time Students	15/12	12	6/3
Graduate Assistants ($\frac{1}{4}$ time)	15/9	15/6	6/3
Graduate Assistants ($\frac{1}{2}$ time)	12/9	12/6	6/3

FINANCIAL SUPPORT

Financial support is awarded based on several factors, which include academic merit, the teaching needs of the department and also the availability of funds. Eligible first year graduate students are awarded a Teaching Assistantship (T.A.) for the first two semesters. This assistantship includes a Stipend (pay) and a Graduate Assistant Differential (GAD), which is that portion of the tuition and fees paid by the university for the student. The remainder of the tuition and fees paid by the student every semester and summer session is termed the Graduate Fee. In certain instances, first year students may be awarded a Research Assistantship (R.A.), or a combined R.A./T.A.. In both cases, the assistantship includes the stipend and GAD. After the two semesters, most students will be placed on a R.A. or on a research stipend (which does not include a GAD). Any student receiving financial support must log into the Time Capture system to record their time each week.

Graduate students are eligible for continued financial support provided they are: (1) enrolled full-time; (2) in good academic standing, i.e., not on probation; (3) making satisfactory progress towards their degree based on their research and work ethic; and (4) the availability of funds. If a student changes his/her subject area after support has been extended, support eligibility will be reviewed and may be terminated.

MSE GRADUATE COURSES

<u>GRADUATE COURSES</u>	<u>RECOMMENDED PRE-REQUISITES</u>
<u>MSE 8100</u> Fundamentals of Materials Science	
<u>MSE 8190</u> Inorganic Materials Characterization Techniques	
<u>MSE 8200</u> Deformation Mechanisms in Solids	<u>MSE 4220/6220</u> Mechanical Behavior of Materials
<u>MSE 8210</u> Fracture and Fatigue	
<u>MSE 8250</u> Solid State Materials Science	<u>MSE 4020/6020</u> Solid State Materials
<u>MSE 8260</u> Phase Equilibria in Materials Systems	<u>MSE 3260</u> Thermodynamics of Materials
<u>MSE 8270</u> Kinetics of Phase Transformations	<u>MSE 3270</u> Transport Phenomena
<u>MSE 8280</u> Phase Transformations in Materials Science	<u>MSE 3270</u> Transport Phenomena
<u>MSE 6570</u> Color Science	<u>MSE 4150/6150</u> Introduction to Polymer Sci & Eng
<u>MSE 8510</u> Polymer Science I	<u>MSE 4150/6150</u> Introduction to Polymer Sci & Eng
<u>MSE 8520</u> Polymer Science II	<u>MSE 4150/6150</u> Introduction to Polymer Sci & Eng
<u>MSE 8400</u> Analytical Methods in Textile and Polymer Science	
<u>MSE 8610</u> Fiber Physics I	<u>MSE 4610</u> Polymer & Fiber Science III
<u>MSE 8620</u> Fiber Physics II	
<u>MSE 8660</u> Fiber Formation	<u>MSE 4610</u> Polymer & Fiber Science III

CURRICULUM DEVELOPMENT – PLAN OF STUDY – GS2 FORM

The GS2 is a set of electronic forms that serve to appoint the graduate advisory committee and notifies the Graduate School of the classes the student will take to fulfill the degree requirements. **It is important to note that any class listed on one's GS2 must be completed before graduation. If changes are necessary, a revised GS2 must be filed.** This form may be found in the student's iRoar portal entered via <https://iroar.clemson.edu/registration.php>.

The student's advisory committee must approve all the courses by electronically signing the student's GS2. All students are expected to develop an area of study with the advice and consent of their advisory committee.

The planned course of study, once approved, must be submitted to the Graduate School via the completion of the electronic GS2 found in iRoar. The GS2 must be completed as soon as the student talks with his/her advisor and determines the course of study he/she will pursue, and is due by the end of the 1st semester for M.S. students and by the end of the 3rd semester for PhD students.

Procedure to Compete GS2:

1. Log into iRoar
2. Choose the "Student" tab
3. Under the "Registration" drop down, select "GS2 Committee Selection"
4. Fill out the form with your Committee Chair's information along with your other committee members' information. Once all information has been entered, submit the form for approval by the Committee Chair and additional committee members.
5. Once approved, log back into iRoar and under "Student" → "Registration" select "GS2 Plan of Study"
6. Using the student's anticipated graduation date for completion of research hours, their advisor's input and research emphasis as guidance, the student should fill in the form.
7. Once completed, the form will be electronically submitted to the necessary parties for approval.

POLICIES AND PROCEDURES FOR COMBINED B.S. AND M.S. DEGREES

Materials Science and Engineering undergraduate students at Clemson University may begin a Master of Science (M.S.) degree program while completing their Bachelor of Science (B.S) and use a limited number of courses to satisfy the requirements of both their undergraduate and graduate degrees. The following specific requirements apply:

A. Undergraduate/ Graduate Student Transition:

1. Undergraduate students must have an overall GPA of 3.4 or higher through their sophomore year. Students are expected to maintain this GPA to continue through the combined program
2. Up to 12 credit hours from a 6000 level or higher courses may be used to satisfy the requirements of their B.S. degree. 6000-level versions of courses required in the B. S. curricula may not be used (for example- MSE 6150).
3. Students in a combined degree program are conditionally accepted to the graduate program until completion of the BS degree requirements.

B. Graduate Program

The M.S. curriculum provides skills and expertise that enhance the individual's ability to contribute to the technical workforce. The thesis option will require a minimum of 30 credit hours and followed by the submission of thesis. Students are required to take at least six (6) MSE graduate courses chosen by the student in consultation with their advisor and advisory committee members while maintaining a minimum 3.0 overall GPA. All students must take six (6) hours of graduate level independent research. Further details on the completion of a Thesis Masters are outlined in the "Minimum Degree Requirements for Thesis M.S. in MSE" and "Masters Thesis" sections.

It is suggested that students take the recommended core courses and then some of the elective courses from within and outside the department offerings. A student who has previous graduate work at another institution that has not been used towards a degree may petition the Graduate Committee to transfer up to nine (9) semester credit hours of relevant course work with grades of "B" or better.

Core Courses:

- MSE 8100 Fundamentals of Materials Science (3 credits)(3,0)
- MSE 8260 Phase Equilibrium in Materials Systems (3 credits)(3,0)
- MSE 8270 Kinetics of Phase Transformations (3 credits)(3,0).

One of the following:

- MSE 8400 Analytical Methods in Textile and Polymer Science (4 credits)(3,0)
- MSE 8190 Inorganic Materials Characterization Techniques (4 credits)(3,0)

POLICIES AND PROCEDURES FOR MASTER'S DEGREES

Important: Please follow the “Thesis M.S. Student Checklist” on page 60 to make sure that you are on the track to complete your degree requirements.

Introduction

These policies supersede any policies outlined in graduate manuals written prior to the current semester. Academic regulations pertaining to the various degree programs are published in the “*Graduate School Catalog*,” the “*Graduate School Policy Handbook*” and on-line at <http://www.registrar.clemson.edu/html/catalogGrad.htm> and www.clemson.edu/graduate/students/policies-procedures/index.html.

Selecting a Research Advisor

All beginning M.S. students are asked to confer with each MSE faculty member in whose general area they may have an interest. Upon having done so, the student selects a research advisor subject to the consent of the selected faculty member. The student subsequently begins to formulate research plans with the advice of their advisor.

Advisory Committee

The student, working with his/her advisor, selects an advisory committee. The advisory committee should be chosen by the beginning of the student’s second semester. The advisory committee shall consist of a minimum of three (3) members who hold faculty appointments at Clemson University. A majority of the committee shall hold tenure/tenure-track faculty appointments in the Department of Materials Science & Engineering. Part-time visiting and other non-tenure-track faculty employed by Clemson University, Emeriti faculty, and Adjunct faculty may serve as advisory committee members but may not serve as chair. The chairperson of the committee is usually the research advisor and must hold a full time faculty appointment at Clemson University. If the student has declared an emphasis in another field, at least one of the committee must be from the faculty of the program of the emphasis area.

The student’s advisory committee will perform the following functions:

- Provide advice and consent in the selection of course work by the student;
- Assist in supervision of the student’s thesis research program;
- Meet with the student six months prior to the final oral examination to review progress;
- Administer the final oral examination;
- Approve the Master’s thesis when requirements are met; and,
- Initiate recommendation to the Graduate School for awarding of the degree.

MINIMUM DEGREE REQUIREMENTS FOR THESIS M.S. IN MSE

Course Credit Hours	24 Hours*
Core + Other courses required	4 core + 4 other = 8
Master's Research MSE 8910	6 hours (Grad School requirement) plus Thesis completion
Credit Requirement (Total Course Plus Research Credit Hours):	A minimum of 30 credit hours past the bachelors*
Exams	Thesis Defense
Seminar	1 presentation**

*Does not include MSE 8000/8010 Materials Research Seminars

** Student must register for MSE 8010 to receive credit for seminar presentation

Course Deficiencies

The MSE Graduate Program is not designed to be a “remedial or entry-level” program; therefore, students are expected to have the appropriate technical background prior to entering these programs. If course deficiencies are identified and/or if remediation is specified as a condition of a student’s admission, it is important that the remediation requirements be met early in the program in order to provide the student with background for graduate level courses. Normally, these deficiencies are removed by taking and passing specified required courses during a normally scheduled course offering. However, these courses do not count toward the total number of semester hours of graduate credit (exclusive of MSE 8000/8010) required for graduation.

Core Courses

Students are required to take at least six (6) of their eight (8) courses from MSE graduate courses which are chosen by the student in consultation with their advisor and advisory committee members. Of the six (6) MSE courses, four are required core courses which are indicated below. Students are required to maintain a minimum 3.0 overall GPA in order to graduate with a M.S. degree. *All students must also enroll in MSE 8000 Seminar in Materials Research every semester, with the exception of the semester they present in seminar and are enrolled in MSE 8010 Graduate Student Seminar in Materials Research.*

Mandatory Courses:

MSE 8100 Fundamentals of Materials Science (3 credits) (3,0)

MSE 8260 Phase Equilibrium in Materials Systems (3 credits) (3,0)

MSE 8270 Kinetics of Phase Transformations (3 credits) (3,0)

Analytical and Characterization Courses (choose one):

MSE 8400 Analytical Methods in Textile and Polymer Science (4 credits) (3,0)

MSE 8190 Inorganic Materials Characterization Techniques (4 credits) (3,0)

Additional Recommended Courses from MSE:

MSE 8200 Deformation Mechanisms in Solids (3 credits) (3,0)

MSE 8210 Fracture and Fatigue (3 credits) (3,0)

MSE 8250 Solid State Materials Science (3 credits) (3,0)

MSE 8280 Phase Transformations in Materials Science (3 credits) (3,0)

MSE 8510 Polymer Science I (3 credits) (3,0)

MSE 8520 Polymer Science II (3 credits) (3,0)

MSE 8610 Fiber Physics I (3 credits) (3,0)

MSE 8620 Fiber Physics II (3 credits) (3,0)

MSE 8660 Fiber Formation (3 credits) (3,0)

Curriculum Development – Plan of Study – GS2 Form

The student should develop a plan of coursework with the assistance of the research advisor. This should be done by the end of the first semester. This plan is formally submitted to the Graduate School via the GS2 Form (See **Curriculum Development - Plan of Study - GS2 Form** on page 13).

Graduate Diploma Application

Students apply for graduation through their iRoar account. Choose the "Apply for Graduation" link under the "Student Record" menu. The graduation application is required for any student intending to graduate, not just students planning to walk at graduation.

MASTERS THESIS

The purpose of the M.S. thesis is to demonstrate the capability of the student to:

- Formulate a research problem;
- Demonstrate knowledge relevant to a meaningful resolution of a specific problem;
- Effectively plan the work leading to the completion of the problem;
- Report the results of the problem in a concise, precise professional style.

Selecting a Research Topic

Research advisors will assist students in the selection of an appropriate topic for their thesis. Students are expected to have selected a thesis topic by the end of their first semester of graduate study.

For additional information on technical writing, the following are recommended:

- *How to Publish a Scientific Paper* by Robert A. Day;
- *Scientific English: A Guide for Scientists and Other Professionals* by Robert A. Day;
- *The ACS Style Guides: a Manual for Authors and Editors* edited by Janet S. Dodd.

Pre-Defense Advisory Committee Meeting

Approximately six months before the expected final oral defense, an advisory committee meeting should be held. The purpose of this meeting is for the candidate and the committee to discuss the expectations for graduation.

Thesis Text

Introduction

The introduction to the thesis should include some brief introductory remarks and a review of the literature that is relevant to the stated objectives. The literature review should be current and organized to support the research objectives.

Research Objective

This section should contain a paragraph summarizing the major objective of the research. The major objective, whenever possible, should be stated as a hypothesis with tasks outlined for testing the hypothesis. *It is often suggested that this section be written first.*

Research Methodology

This section should outline the experimental/theoretical/computational approach that has been used to accomplish the tasks listed in the objectives section. The approach should include the experimental/theoretical/computational design and a matrix of experiments conducted. The methodology should include procedures and analytical protocol or information about the development of those procedures. Information about the data collection and the use of the data should be provided, as well as final evaluation approaches.

Results and Discussion

In this section, the results have to be presented in a comprehensive and clear form. The analysis of the results has to be given and discussed. The student has to demonstrate the ability to analyze results based on the materials science & engineering fundamentals.

Conclusions

In this section, the main challenging steps of research procedures have to be briefly discussed and their strong and weak points must be mentioned. The results of the conducted research have to be delivered in a concise form and the proposed mechanisms explaining the results should be clearly articulated

Significance

This section should be a brief summary of why it is important to conduct the proposed research. What are the results and how will they benefit the Materials Science & Engineering community?

HELPFUL HINTS

- Students should use the recommended Graduate School format desired for references, font and other formatting items.
- Whenever possible, use the active voice as the use of the first person is generally discouraged in technical writing.
- Avoid starting sentences with numbers. Numbers less than or equal to ten should be spelled out. Numbers of 11 or more can be represented by Arabic numerals. However, if referring to an exact amount such as 1.0 mL, use numerals.

Graduate Diploma Application

Students apply for graduation through their iRoar account. Choose the "Apply for Graduation" link under the "Student Record" menu. The graduation application is required for any student intending to graduate, not just students planning to walk at graduation.

Thesis Deadline

A first draft of the thesis should be completed well before the date of the final oral examination. A final draft (approved by the advisor) should be submitted to the advisory committee at least two weeks before the oral exam. Consult your advisory committee for specific requirements.

Final Oral Examination

The final oral examination is given at least three weeks before the date on which the degree is to be conferred. This is given under the authority of the student's advisory committee in accordance with Graduate School deadlines. The committee will have been given final draft copies of the thesis a minimum of two weeks prior to the exam.

The chair of the student's advisory committee will schedule the examination that is administered by the committee. During the examination, the student will be expected to orally present the findings of the research, support various aspects thereof, and be questioned on integrated knowledge of related coursework. The Graduate School will be notified of the date, time and place of the examination at least ten days prior to the date scheduled. At the same time, members of the MSE faculty, the Graduate Standards Committee, the Dean of the Graduate School, and MSE students will be invited to attend the examination. Procedurally, the examination normally consists of a 30-45 minute presentation made by the student

followed by questions posed, first by those in attendance and second by the members of the student's graduate advisory committee.

The results of the oral defense are submitted to the Graduate School via the GS7-M form. This form must be filled out and taken to the defense by the student and signed by the Committee. Once complete, the form should be submitted to both the MSE Program Manager and to the Graduate School.

Unsatisfactory performance on the final examination, as determined by the advisory committee, will result in at least one of the following actions to be taken:

1. Additional work on the thesis and resubmission of the thesis to the advisory committee for further review; or
2. Additional study in their area of specialty.

In case of failure, the advisory committee is required to submit the GS7-M form to the MSE Program Manager and to the Graduate School stating that the student failed the final examination. A second failure on the final examination shall result in the student being declared ineligible for a Master's Degree in MSE at Clemson University.

MINIMUM DREGREE REQUIREMENTS FOR NON-THESIS M.S. IN MSE

Course Credit Hours	24 Hours*
Core + Other courses required	4 core + 6 other** = 10
Credit Requirement (Total Course Plus Research Credit Hours):	A minimum of 30 credit hours past the bachelors*
Exams	Publishable Report
Seminar	1 presentation**

*Does not include MSE 8000/8010 Materials Research Seminars

**6 additional courses is approximate and based on all being 3 credit courses (may vary depending on the number of credit hours for each course)

*** Student must register for MSE 8010 to receive credit for seminar presentation

Course Deficiencies

The MSE Graduate Program is not designed to be a “remedial or entry-level” program; therefore, students are expected to have the appropriate technical background prior to entering these programs. If course deficiencies are identified and/or if remediation is specified as a condition of a student’s admission, it is important that the remediation requirements be met early in the program in order to provide the student with background for graduate level courses. Normally, these deficiencies are removed by taking and passing specified required courses during a normally scheduled course offering. However, these courses do not count toward the total number of semester hours of graduate credit (exclusive of MSE 8000/8010) required for graduation.

Core Courses

Students are required to take at least six (6) of their eight (8) courses from MSE graduate courses which are chosen by the student in consultation with their advisor and advisory committee members. Of the six (6) MSE courses, four are required core courses which are indicated below. Students are required to maintain a minimum 3.0 overall GPA in order to graduate with a M.S. degree. ***All students must also enroll in MSE 8000 Seminar in Materials Research every semester, with the exception of the semester they present in seminar and are enrolled in MSE 8010 Graduate Student Seminar in Materials Research.***

Mandatory Courses:

MSE 8100 Fundamentals of Materials Science (3 credits) (3,0)

MSE 8260 Phase Equilibrium in Materials Systems (3 credits) (3,0)

MSE 8270 Kinetics of Phase Transformations (3 credits) (3,0)

Analytical and Characterization Courses (choose one):

MSE 8400 Analytical Methods in Textile and Polymer Science (4 credits) (3,0)
MSE 8190 Inorganic Materials Characterization Techniques (4 credits) (3,0)

Additional Recommended Courses from MSE:

MSE 8200 Deformation Mechanisms in Solids (3 credits) (3,0)
MSE 8210 Fracture and Fatigue (3 credits) (3,0)
MSE 8250 Solid State Materials Science (3 credits) (3,0)
MSE 8280 Phase Transformations in Materials Science (3 credits) (3,0)
MSE 8510 Polymer Science I (3 credits) (3,0)
MSE 8520 Polymer Science II (3 credits) (3,0)
MSE 8610 Fiber Physics I (3 credits) (3,0)
MSE 8620 Fiber Physics II (3 credits) (3,0)
MSE 8660 Fiber Formation (3 credits) (3,0)

Curriculum Development – Plan of Study – GS2 Form

The student should develop a plan of coursework with the assistance of the research advisor. This should be done by the end of the first semester. This plan is formally submitted to the Graduate School via the GS2 Form (See **Curriculum Development - Plan of Study - GS2 Form** on page 13).

Graduate Diploma Application

Students apply for graduation through their iRoar account. Choose the "Apply for Graduation" link under the "Student Record" menu. The graduation application is required for any student intending to graduate, not just students planning to walk at graduation.

POLICIES AND PROCEDURES FOR PH.D. DEGREES

Important: Please follow the “Ph.D. Student Checklist” on page 63 to make sure that you are on the track to complete your degree requirements.

Introduction

These policies supersede any policies outlined in graduate manuals written prior to the current semester. Academic regulations pertaining to the various degree programs are published in the “*Graduate School Catalog*,” the “*Graduate School Policy Handbook*” and on-line at www.clemson.edu/graduate/students/policies-procedures/index.html.

Selecting a Research Advisor

All beginning Ph.D. students should confer with each MSE faculty member in whose general area they may have an interest. Upon doing so, the student should select a research advisor subject to the consent of the selected faculty member. The student subsequently begins to formulate research plans with the advice of his/her advisor. The student should have determined their research advisor by the beginning of their second semester in the program.

Advisory Committee

The student, working with his/her advisor, should select an advisory committee no later than the end of the third semester. The Ph.D. advisory committee shall consist of a minimum of four (4) members who hold faculty appointments at Clemson University. A majority of the committee shall hold tenure/tenure track faculty appointments in the Department of Materials Science & Engineering. Part-time visiting and other non-tenure-track faculty employed by Clemson University, Emeriti faculty, and Adjunct faculty may serve as advisory committee members but may not serve as chair. The chairperson of the committee is usually the research advisor and must hold a full time faculty appointment at Clemson University.

The student’s advisory committee will perform the following functions:

- Provide advice and consent in the selection of course work by the student;
- Assist in supervision of the student’s dissertation research program;
- Administer the comprehensive and final oral examinations;
- Meet with the student twelve months prior to the final oral examination to review progress;
- Approve the dissertation;
- Initiate recommendation to the Graduate School for awarding the degree.

Curriculum Development – Plan of Study – GS2 Form

The student should develop a plan of coursework with the assistance of the research advisor and input from the advisory committee. This should be done by the end of the third semester. This plan is formally submitted to the Graduate School via the GS2 Form (See **Curriculum Development - Plan of Study-GS2 Form** on page 13).

MINIMUM DEGREE REQUIREMENTS FOR THE PH.D. IN MSE

Total Hours of Courses	16 hours*
Core Courses Required	5
Doctoral Research – MSE 9910	18 hours (Grad School)
Credit Requirement (Total Course Plus Research Credit Hours):	A minimum of 60 credit hours past the bachelors or a minimum of 30 credit hours past the masters*
Exams	Comprehensive and Dissertation Defense (Final Examination)
Seminar	2 Presentations**

*Does not include MSE 8000/8010 Materials Research Seminars

** Student must register for MSE 8010 to receive credit for seminar presentations

Core Courses

Students pursuing a Ph.D. in MSE are required to take the following courses which will result in the completion of five (5) core courses. Decisions about which courses to take, where applicable, should be made by the student in consultation with his/her supervisor and advisory committee. Students are required to complete the first four (4) core courses by the end of their third fall/spring semester and all five (5) core courses within their first two (2) years. In order to be qualified to take the Comprehensive Exam, they must have taken at least four (4) of their core courses.

Mandatory Courses:

- MSE 8100 Introduction to Materials Science
- MSE 8260 Phase Equilibrium in Materials Systems
- MSE 8270 Kinetics of Phase Transformations

Analytical and Characterization Courses (choose one):

- MSE 8400 Analytical Methods in Textile and Polymer Science
- MSE 8190 Inorganic Materials Characterization Techniques

One additional MSE 8000 level course.

Other courses, which the supervisor/committee recommends to the student, may be taken; however, the grades in these courses will not be used in calculating the minimum GPA required to take the Ph.D. Comprehensive Examination. ***All students must also enroll in MSE 8000 Seminar in Materials Research every semester, with the exception of the semesters they present in seminar and are enrolled in MSE 8010 Graduate Student Seminar in Materials Research.*** The student must maintain a minimum 3.0 overall GPA for all classes taken during his/her graduate study to be eligible for Ph.D. degree.

If a student has completed comparable course work or obtained a Masters degree at another Institution, she/he must still complete the five (5) core classes in the Department of MSE at Clemson University with the first four (4) completed prior to attempting the Comprehensive Exam. If student has received their MS from the Department of MSE at Clemson University, the student may CU MSE can use courses taken during their M.S. to fulfill core course requirements for the comprehensive exam. Their GPA of these courses will be not considered if the average of their M.S. courses was equal to or above a 3.50 GPA.

PH.D. COMPREHENSIVE EXAMINATION

Qualification and Eligibility Requirements for Students to Take Comprehensive Exam

Doctoral students are required to have a minimum GPA of 3.45 in four (4) of their core courses in order to be eligible to take the comprehensive examination. Students must have taken four (4) of their five (5) courses by the end of their third fall/spring semester.

Additionally, students must make their first attempt at the comprehensive exam no later than their fifth fall/spring semester. Qualified students must declare eligibility by submitting the form “Declaration of Qualification for Ph.D. Comprehensive Examination” found on page 29.

Students who have GPA lower than 3.45 would be allowed to stay in the PhD program during a probation period up to one year without switching to the master program. During this period of time, they must take three additional MSE 8000 level courses or equivalent from other departments subject of approval by the advisor and the GSC. If the average GPA of all 8 courses after this probation year is equal or exceeds 3.45, the student can continue his/her PhD program. If the average GPA of all 8 courses is below 3.45, the student will either be transferred to the master program and work toward a master degree or leave the MSE graduate program.

Students will have two (2) attempts at both the written and the oral portions of the comprehensive exam. All attempts must be completed by the end of the student’s sixth fall/spring semester and within twelve (12) months of the submission of the proposal.

Those students not meeting this time deadline will be:

1. Required to complete the M.S. degree in MSE prior to seeking re-admission to the Ph.D. program; or
2. Dismissed from the Ph.D. program if they have already earned the M.S. degree at Clemson.

Content of Comprehensive Examination and Expectations

The candidacy/comprehensive examination will consist of: (1) a written dissertation proposal; and (2) an oral exam. The examination will be conducted and administered by the student’s advisory committee plus one external examiner appointed by the graduate standards committee. The supervisor can advise the student on topic and general content of the proposal but has no say in the pass/fail outcome of either the written proposal or the oral examination. It is expected that the written document will be solely the work of the student.

Students will be expected to have an in-depth knowledge in their selected research area including relevant literature, experimental methods, and fundamental assumptions and limitations. In addition, students are expected to be ready to answer all pertinent questions in this topic area based on the courses taken at the time of the examination that the examining committee deems relevant to the area of proposed research. Students must also be prepared to answer basic questions about materials science and engineering or polymer and fiber science, which are representative of a senior undergraduate major in the area. Suitable texts that cover these concepts will be recommended to students when necessary. The students must also be able to critique approaches and methodologies used by them and others cited in the literature.

If the outcome of the candidacy/comprehensive examination results in a “fail” the student will have one chance to retake the candidacy/comprehensive examination.

Results of the Comprehensive Exam are communicated to the Graduate School through the GS5D. At the end of the Comprehensive Examination, the form should be signed by the committee indicating either a pass or a fail and submitted to both the MSE Program Manager and to the Graduate School.

Ph.D. Comprehensive Exam Schedules

If a student starts his/her comprehensive exam in the Fall semester, the deadline dates for the following academic year will be:

- Electronic submission of an intent to take the comprehensive exam (form “Declaration of Qualification for Ph.D. Comprehensive Examination” found on page 30) must be presented to the MSE Graduate Standards Committee Chair with a printed copy to the Program Manager: before **August 15th**
- Electronic submission of a written proposal (PDF file), exam statement (form “Ph.D. Comprehensive Examination Statement of Topical Areas and Personal Contribution to the Formulation of Ideas & Research” found on page 35) to the Graduate Standards Committee Chair (the 1st attempt): before **September 15th**
- Review of proposal by the student’s committee members and the external examination chair. All reviewers will calculate a score and the external examiner will average the scores and submit comments/scores to the Graduate Standards Committee Chair by **October 15th**
- Feedback to the student on the written proposal by the Graduate Standards Committee Chair: by **October 15th**
- The student should meet with each member of the examination committee for additional comments concerning the written proposal and topics: before **November 15rd**.
- If the student receives a “pass” in the first attempt of the written proposal, schedule Oral Exam: before **December 1st**
- If the student receives a “fail” in the first attempt of the written proposal, he/she should complete the following--
 - Resubmission of a written proposal: before **January 15th**
 - Receive feedback from committee members/external reviewer (of the 2nd attempt of the written proposal): before **February 15th**
 - Schedule the Oral exam – the first attempt (if the student receives a “pass” in the written exam in the 2nd attempt): before **March 15th**
- If the student receives a “fail” in the first attempt of the oral exam, the time for the second attempt will be suggested by the committee. This second attempt must be completed before **September 15th** of the following year, or less than one year from the start date to satisfy a Graduate School Regulations.

If a student starts his/her comprehensive exam in the Spring semester, the deadline dates for the following academic year will be:

- Electronic submission of an intent to take the comprehensive exam (form “Declaration of Qualification for Ph.D. Comprehensive Examination” found on page 30) must be presented to the MSE Graduate Standards Committee Chair: before **December 15th**
- Electronic submission of a written proposal (PDF file), exam statement (form “Ph.D. Comprehensive Examination Statement of Topical Areas and Personal Contribution to the

Formulation of Ideas & Research” found on page 35) to the Graduate Standards Committee Chair (the 1st attempt): before **January 15th**

- Review of proposal by the student’s committee members and the external examination chair. All reviewers will calculate a score and the external examiner will average the scores and submit comments/scores to the Graduate Standards Committee Chair by **February 13th**.
- Feedback to the student on the written proposal by the Graduate Standards Committee Chair: by **February 15th**
- The student should meet with each member of the examination committee for additional comments concerning the written proposal and topics: before **March 15th**
- Oral examination is to be scheduled for the first attempt (if “pass” the written exam in the 1st attempt): before **April 1st**
- If the student receives a “fail” in the first attempt of the written proposal, he/she should complete the following--
 - Resubmission of a written proposal: before **May 15th**
 - Receive feedback from committee members/external reviewer (of the 2nd attempt of the written proposal): before **September 1st**
 - Prepare for the Oral exam – the first attempt (if “pass” the written exam in the second attempt): before **January 15th**
- If the student receives a “fail” in the first attempt of the oral exam, the time for the second attempt will be suggested by the committee. This second attempt must be completed before **January 15th** of the following year, or less than one year from the start date (to satisfy a Graduate School Regulation).

Timeline for selection and approval of the three oral exam topics will be:

- The student should work with the major advisor and advisory committee to select three initial oral examination topics, and submit them along with the written proposal by **September 15th** or **January 15th**
- Then the examination committee, led by the external chair, will discuss and confirm the three topics, and submit them to the Graduate Committee chair, along with the feedbacks of the written proposal by **October 15th** or **February 15th**
- The Graduate Committee chair will assemble all examination topics for all candidates, and submit them to the full faculty for approval.

Declaration of Qualification
For Ph.D. Comprehensive Examination

Legal Name: _____

Date: _____

List Core Courses Taken and Grade Received in Each:

Core Course GPA: _____

I am hereby eligible to begin the Ph.D. Comprehensive Examination, beginning:

____ Fall Semester _____(year) – **Form must be submitted prior to August 15th**

or

____ Spring Semester _____(year) – **Form must be submitted prior to December 15th**

Student Signature _____

Advisor's Name (please print) _____

Advisor's Signature _____

Submit to Program Manager

Guidelines for the Ph.D. Research Proposal

Each member on the student's advisory committee (including the research advisor), as well as an additional external faculty examiner appointed by the Graduate Standards Committee Chair, will evaluate the written proposal and provide a numerical score (0-100) and optional additional comments. Each committee member is asked to use the following rubric when marking the oral proposal.

Introduction Section:

- *15 Pts. Possible*
- Reviewer should identify if the student satisfactorily communicated the project motivation, objective and tasks.

Background Section:

- *20 Pts. Possible*
- Reviewer should identify if the student satisfactorily communicated that he/she conducted a literature review, preliminary experiments, analysis of preliminary results and showed critical analysis.

Research Plan Section:

- *40 Pts. Possible*
- Reviewer should comment on the details on planned research, technical language, rigor of analytical methods and/or engineering analysis

Potential Original Contribution and Impacts on Science & Engineering:

- *10 Pts. Possible*

References:

- *7 Pts. Possible*

Technical Writing Quality:

- *8 Pts. Possible*

The external evaluator will collect and average all scores. A proposal will receive a "Pass" if the average adjusted score is greater than or equal to 60%. A proposal will receive a "Fail" if the average adjusted score is less than 60%. The average numerical score, along with the verbatim comments, will be sent to the student.

The written document should reflect an effort by the student and not be the work of the research advisor. It is expected that the Comprehensive Exam research component will be parallel to, but not necessarily identical to, the candidate's dissertation. To ensure this, the candidate's research proposal cannot be identical to research previously proposed by the advisor, e.g., to an external funding agency and must clearly identify the candidate's work. The candidate may, however, use the same research hypothesis and design new experimental/computational/modeling pathways to validate the hypothesis or objective. The advisor must work with the student on the direction of research, points of clarification, essential grammar and technical style, and on improving the structure of the document. However, it is up to the student to produce the majority of the document and the student is the one responsible for the final product. Specifically, the student is responsible for the writing of the document. The advisor must provide mentoring guidance regarding formatting, and editing for clarity of the content.

The research proposal defense is public and thus no request for confidentiality can be made to the examination committee, no exceptions.

The Research Proposal is intended to provide the student with the opportunity to:

- a. Show they are capable of undertaking a specific research project on a chosen topic with minimum supervision in the area of specialization;
- b. Demonstrate their ability and initiative to organize and plan such investigative work;
- c. Undertake a literature survey and critically apply their findings;
- d. Develop their ability to analyze and solve problems and produce or suggest rational solutions to such problems;
- e. Interpret the data produced from their investigations and draw conclusions;
- f. Present a concisely written research proposal;
- g. Use appropriate information from the research proposal for the oral defense of said proposal;
- h. Communicate to faculty the basic problem and the experimental, practical or theoretical work undertaken, and to discuss the results and conclusions to date.

While Research Proposals will vary to some extent in quantity and type of information, the various sections of the proposal should be structured as close as possible in the following way:

A. Statement of Research Objective

A well-stated objective leads one directly to the approach that must be taken to accomplish the objective. This initial statement should be written such that any informed scientist should be able to understand what you intend to do. The research objective may be written in the following forms (other variations are possible):

- The research objective of this proposal is to test hypothesis H .
- The research objective of this proposal is to measure parameter P to within an accuracy of A .
- The research objective of this proposal is to prove conjecture C .
- The research objective of this proposal is to apply method M from field F to problem X in field Y .

B. Introduction and Motivation

The introduction should explain why the project is considered to be of importance, be it from a financial, technological, environmental, or academic viewpoint. The reader should clearly understand your motivation for the work and why this research is necessary.

The goal of the project should be reiterated next. This should be followed with an outline describing the specific tasks necessary to accomplish this goal. This should be written as concisely as possible.

C. Background

This section should consist of a literature survey describing what has been done previously to solve the problem related to the research objective. Sufficient background should be given so that the reader will understand the techniques and

approaches described in the research plan. This section should show evidence that the student is well read in the subject and can critically review the works of other authors.

Following the literature review, the author should present preliminary data and provide analysis of the findings. The data presented should support the research plan and provide additional motivation for the project.

D. Research Plan

In this section, the work to be carried out should be described in detail. This will be an expansion upon the research tasks listed in the introduction. The student should demonstrate a clear plan that will have a high likelihood of accomplishing the research objective. The student should consult with the faculty advisor to insure that the presented plan will be meaningful and capable of producing reliable results. In addition, the student should comment on any limitations in the plan and alternative methods if the initial plan is unsuccessful.

E. Potential Original Contribution and Broader Impacts for Science

This section should contain anticipated results and potential scientific merits and impacts. The proposal should indicate the student's potential for an original contribution to the field. The resulting impact of this work should be described from the prospective on how this particular work enhances our understanding of natural phenomena as scientists and engineers.

F. References

Any references to books, journals, patents, and theses must be referenced. References to websites will not be accepted. Concrete website information is often based on more substantial papers, journal articles or internal industry research, and these should be located for reference.

The student may adopt a commonly used reference style in the field (please check professional journals in the field for examples). The full title of the articles should be included.

Statement on Personal Contribution to the Formulation of Ideas and Plan of Research

A statement is required expressing the student's contribution to the formulation of the ideas for this proposed work. The ideas of others should be noted alongside those of the student. This form can be found on page 35 and should be turned in with the written proposal to the Graduate Standards Committee Chair electronically.

Formatting of Research Proposal

The proposal has a basic format and should be no more than 5,000 words as determined by Microsoft Word (approx. 15 pages long). This length is determined excluding appendices, graphs, charts, tables, and references. Proposals longer than this limit indicate that the student is unable and/or incapable of being brief enough to provide a proposal of a specified length. Proposals longer than those specified may be penalized, especially if content is judged to be 'padding' which could have been shortened or omitted.

The proposal must be typed, using standard 12 POINT typeface (Arial, Helvetica, Times New Roman), with double spacing on standard paper, leaving a margin of at least 25 mm (1 inch) on the left side, 20 mm (0.75 inches) on the right side and 25 mm (1 inch) top and bottom of the sheet.

Any acronyms used should be initially defined by fully writing out with the acronym in parentheses following the text, e.g. *General Skewed Data (GSD)*. If several such abbreviations are to be used in the text, the student should also include a page with a glossary of terms.

Diagrams, graphs, charts, equations, etc. should be numbered consecutively throughout the proposal, or, better still, numbered consecutively within each section, e.g. Figure 2.3 (denotes the third figure in section 2). Whenever possible, charts, tables, etc. should be included in an appendix with only summary versions in the text.

Plagiarism and Inadequate Referencing

Plagiarism is strictly prohibited. Please refer to the pages 2-3 in “MSE Graduate Student Manual” and any relevant Clemson University academic regulations for the definitions of *plagiarism*. *Inadequate referencing* is where students have indicated that they are quoting another person's work but fail to reference it adequately in the discussion, resulting in confusion as to where their own work began and the cited work ended. The penalties for plagiarism and inadequate referencing are severe. Normally, it is a failed Project and possible expulsion from the MSE program and Clemson University. No further warnings on violation of this type will be provided to the student.

Delivery of Written Proposal to Committee Members

The proposal along with three topics has to be submitted to the GSC Chair electronically. The proposal topic should be logically expressed and the proposal written in clear, unambiguous English.

**Ph.D. Comprehensive Examination Statement
Of Topical Areas and Personal Contribution
To the Formulation of Ideas and Research**

Topical areas selected for my comprehensive exam were compiled by me after discussion with my advisor and committee members. They are:

1. *Insert description*
2. *Insert description*
3. *Insert description*

I, _____ (type name), developed the submitted research proposal with the help of _____ (insert faculty, staff, collaborators who aided development). My most significant contributions were

_____ (insert and describe contributions to proposal development).

Student's Full Name _____

Student Signature _____

Date _____

Confirmed by:

Advisor's Name (please print) _____

Advisor's Signature _____

Submit to the current Graduate Standard Committee Chair along with copy of proposal by listed deadline.

MSE Oral Ph.D. Comprehensive Exam Procedures Guidelines

MSE Oral Ph.D. Comprehensive Exam Procedures

- One week before the exam, it is the responsibility of the student to email the committee members to confirm the time, date and place of the oral exam;
- On the day of the exam, the committee members and candidate should arrive five minutes before the presentation and the exam should start on time;
- Before the presentation begins, the appointed external evaluator should hand out to all attending faculty members the list of procedures for undertaking the exam;
- The external evaluator should ask the student if questions can be offered during or after the presentation and all committee members have to follow the student's preference;
- The authority of the external evaluator to control discussions and exam progression should be recognized by all other members;
- The advisor of the student should not be allowed to enter into any discussion during the course of the exam without a clear indication by the external evaluator that doing so is acceptable;
- The time period of the exam should be divided into measurable milestones and the chair should indicate when discussions should end to insure exam progression; the entire exam should be kept to a two hour period;
- The voting for determining a Pass/Fail for the exam should be administered by secret ballot; it's the responsibility of the external evaluator to bring the secret ballot box & scorecards to the exam. All members of the student's committee and the external evaluator have votes. The student's advisor does not vote.
- If a member of the committee is unable to attend the oral exam due to scheduling or sickness, the examination can continue. The final vote will be tallied if a majority of members are in agreement on the Pass/Fail decision. If an additional vote is needed, the missing committee member will meet within one week with the candidate to complete the oral exam and give their vote to the external committee chair.

Description

The oral examination will emphasize the candidate's capability as well as basic knowledge. Each oral exam should be two hours in length. This time will be used for the research presentation, topic examination presentations and relevant questions. Approximately 20-30 slides should be prepared on the written research proposal and should be about 30 minutes in length. Students will be asked questions about their thesis proposal, the three examination topics and also any other questions that the committee deems relevant. The Question & Answer period is expected to range from 30 minutes to one hour in the examination.

Questions may be asked on

- The dissertation proposal;
- The three (3) examination topics;
- Any other "fundamental" MSE questions that a Ph.D. in MSE is expected to know (undergraduate MSE knowledge plus core courses)

The advisory committee may divide Q&A into different sections or conduct them in any order that the committee sees appropriate.

At the end of all the presentations and once the committee has asked all questions that they desire, the candidate will be asked to leave. The committee will use that time to fill out a rubric to help determine the “pass” or “fail” status of the presentation. The committee (plus the Chair of the Examination Committee) will then vote by secret ballot. The committee chair will then collect the ballots and determine the outcome of the exam.

Examination Topics to be Covered in Addition to Research

Three topic examination presentations will also be given by the student at their oral exam. The student should prepare 5-15 slides on each topic (including a discussion of *how the basic theories in these topical areas are related to the proposed dissertation research*). The total presentation for the three topics should not exceed 30 minutes.

The procedure to formulate the three examination topics will be the following:

- The Ph.D. student should initiate discussion with each of his/her advisory committee members (other than research advisor and the examination chair/external evaluator) to formulate at least one topic.
- The Ph.D. student should then work with his/her research advisor to assemble the three topics (and make necessary revisions if there are topical overlaps).
- Finally, the three examination topics should be forwarded to GSC Chair along with the written proposal by **October 1st**.
- The external examiner will be the coordinator and make the decision on the selection of these topics (based on the committee’s opinions). The three examination topics will be then submitted to the chair of the MSE Graduate Standards Committee by **October 1st** along with results of written exam.

Pre-defense advisory committee meeting

Approximately 12 months before the expected final oral defense, an advisory committee meeting should be held. This purpose of this meeting is for the candidate and the committee to discuss the expectations for graduation.

Application for graduation and diploma

Students apply for graduation through their iRoar account. Choose the "Apply for Graduation" under the "Student Record" menu.

Dissertation

A first draft of the dissertation should be completed well before the date of the final oral examination. A final draft (approved by the advisor) should be submitted to the advisory committee at least 2 weeks before the oral exam. Consult your advisory committee for specific requirements.

Final Oral Examination

An oral examination, to be given at least three weeks before graduation, will serve to examine the student on his/her dissertation research. A broad and penetrating

interpretation of the research project and conclusions is required of the student. The committee will have already received final draft copies of the dissertation ten (10) business days prior to the examination. This examination will be conducted under the authority of the Ph.D. advisory committee. All MSE faculty members will be invited to participate in the examination and to provide advisory comments to the committee.

Successful completion of this examination will result in a recommendation (GS7-D Form, www.grad.clemson.edu/forms/forms_graduating.php) by the advisory committee to the Graduate School that the Ph.D. degree be awarded. Unsatisfactory performance on the final examination will require either complete re-examination (with or without recommendations for additional work) or dismissal. A signed copy of the GS7-D must be submitted to the Program Manager and to the Graduate School regardless of pass or fail.

PREPARATION OF THESIS OR DISSERTATION

Planning Dissertation Timeline

The deadlines for the tasks depend on the date of anticipated graduation and are posted at the Graduate School website www.clemson.edu/graduate/students/deadlines.html. A list of the deadlines also can be obtained by contacting the Graduate School. **Failure to meet any of these deadlines will result in postponement of graduation.**

Sufficient time must be allotted for writing the thesis or dissertation. It is highly encouraged and recommended that the student fully completes his/her thesis/dissertation before leaving the university. Experience shows it is very difficult to complete a thesis or dissertation after leaving the university.

Writing the Thesis or Dissertation

The writing process usually begins toward the end of the research period. The document must be written in a format that is acceptable to the Graduate School (M.S. or Ph.D.) The formatting rules that should be followed are outlined at the following website: www.clemson.edu/graduate/students/theses-and-dissertations/index.html

Review and Approval

As a result of the final oral examination and review of the written document by the advisory committee, the student may be required to do more work. After a successful final oral examination, the committee members will provide any comments or corrections that must be made to the thesis or dissertation.

Duplication

A minimum of one bound copy must be made for the research advisor. Additional copies can be made for the student's personal use and for advisory committee members by request. Once the student determines the number of copies needed, s/he should call to schedule an appointment with the Printing Service Center. Unbound copies are produced at the Printing Services Center, but the student must pay for the binding of hardbound copies at the Bursar's Office, located in Sikes Hall. At the appointment, the student will need to pay the duplication fees and describe any special services required (offset printing, photos, etc.). The student can pay for duplication by personal check either directly to the Printing Services Center or at the Bursar's Office and then present a receipt for that payment to the Printing Services Center. The cost for duplication depends on the length and the number of copies requested. Duplication usually takes no longer than one week.

For all current policies, procedures, deadlines, and regulations regarding theses and dissertations, consult the Graduate School website: www.clemson.edu/graduate/

GRADUATE ASSISTANTSHIP AND FINANCES

Assistantship Award Policy

Assistantships are awarded based on many factors, including but not limited to: GPR, GRE scores, recommendations, previous schools, discipline, Statement of Purpose, and English language ability.

Assistantship Funding

The Department of MSE uses two different sources for funding graduate students: State of South Carolina monies and funds from contracts, grants and donations. Students supported by state funds normally are assigned teaching assistant duties while those supported by research contract funds are assigned research duties. All assistantships may be subject to time limits as described below (depending upon the degree being pursued) and are contingent upon satisfactory performance and progress toward the degree by the student.

- Assistantships for M.S. students will normally last for a maximum of two years. The same time limit applies to fellowships awarded by the Department of MSE. Assistantships for Ph.D. students will normally last for three years beyond the M.S. degree. The same applies to fellowships awarded by the Department.
- Continuation of assistantships and fellowships is contingent upon satisfactory academic performance, as well as satisfactory performance of assigned duties associated with the assistantship.
- All research contract and grant supported graduate assistantships are subject to continued funding by the contracting agency. If a research contract or grant is terminated before a student has completed his/her degree program, the Department will endeavor (on an individual basis) to provide financial support to allow completion of the student's program. The foregoing statement should not be construed as an assurance of funding. The student is expected to complete his/her degree program in a timely fashion.

Work Load

The normal half-time (50%) graduate assistantship workload is 20 hours per week (average). Students are sometimes hired for 25% (10 hrs) or 37.5% (15 hrs) of full-time work, under appropriate circumstances. Students should be aware of both their academic and work obligations and are encouraged to discuss any problems with faculty.

Vacations

In addition to days off when the University is closed, students are allowed up to two weeks of vacation time each year. These days should be scheduled with approval of their advisor and these vacations must not interfere with T.A./ R.A. responsibilities.

Start of Pay

Students are appointed to a graduate assistantship at the beginning of the first semester if the student is present and available for a work assignment at that time. Otherwise, pay will begin when the student is available for work. Students with research assignments should report to their research advisor. All other students should report to the Graduate Program Coordinator.

New graduate assistants must report to a departmental Administrative Assistant and complete the following: information sheet, tax forms (federal and state), and I-9 form. Students will need to provide proof of nationality, social security number, age, etc. An appointment will be made to see the college HR representative, who will assist student in completing the necessary paperwork to get on payroll.

International students should have their offer letter with them upon arrival. The student should then see the appropriate Administrative Assistant in 161 Sistine Hall. The student will then be provided with the employee verification form to take to the International Office where they will be instructed on how to obtain a Social Security Number. The Administrative Assistant will also provide them with the paperwork that they must take with their signed Social Security card to the Foreign National Payments Coordinator (call for appointment: 656-5589, E-208 Martin) who will complete the necessary paperwork to assist them with getting on the payroll. When making the appointment, students should ask what forms they should complete prior to the appointment.

For complete information on employment requirements for international students, make an appointment at the Office of International Services (656-3614, Long Hall) or visit their website: <http://www.clemson.edu/administration/ia/services/index.html>. Electronic forms are available under the "Forms and Documents" tab in the sidebar.

Termination of Pay

Pay for any session will end when the student leaves Clemson University or is no longer available for work assignments. Normal termination dates for the Spring and Fall semesters for students not continuing into the next session is graduation day. The student's research advisor or the Department Chair must approve any deviations from these dates.

Reduction of Pay

Normally, 20 hours per week will be submitted on each payroll for each half-time graduate assistant. However, less than 20 hours may be submitted for a student, with the pay reduced accordingly, if the amount of time worked by the student consistently deviates from the required 20 hours per week average. Due to the procedure in which time sheets are currently used, it may be necessary to implement any pay reductions in the pay period following the one in which the work deficiency actually occurred. Pay also may be withheld from students who violate the vacation policy, as stated above in the section on "Vacations."

Summer Enrollment

Students receiving any assistantship or fellowship must enroll in a minimum of six credit hours for the full Summer Session. Any student not on an assistantship but using faculty time and/or university facilities (including any student actively working on a thesis or dissertation) should register for a minimum of one credit hour each session. Only students not active and not physically present at Clemson University need not register.

Students without Assistantships

Students who enter a graduate program in the Department of MSE without an assistantship can apply for future consideration with the Department Chair.

Deferment of Graduate Fees

Graduate assistants may choose to defer tuition and fees. This is accomplished easily on the day of registration. Persons in the fee assessment area will have a list of all graduate assistants. Anyone listed may sign a note to defer these costs and these costs will be deducted from the first six full paychecks of the semester. It is not possible to defer fees for summer sessions. The student must pay these for each summer session.

GENERAL DEPARTMENTAL INFORMATION

Information

Students should not hesitate to ask questions concerning MSE policies and procedures. The Graduate Program Coordinators' task is to assist students with such questions.

Notices

Notices of interest to graduate students will be emailed directly to the students and often posted on the MSE bulletin boards in Surrine and Olin Halls as well. To ensure receipt of MSE mailings, each student should have a current address, email address, and telephone and/or cell phone number on file with the department. MSE also maintains a mail slot for each graduate student, the location of which will be shown to him or her upon beginning with the department.

Paychecks

Students must set up a direct deposit for stipend checks through the University system. **This action is mandatory!** New students going on the payroll for the first time may have a one-month lag before they will be paid. This will be paid out after their termination from the University.

Keys

The key(s) issued to students are for their use only. Keys must never be loaned to anyone else, even another graduate student. Failure to observe this rule may result in withdrawal of key privileges. See the "Quick Reference Guide" for the current key distributor. There is a deposit required for every key issued.

BUILDING SECURITY

It is necessary to maintain the security of the buildings at all times. During normal working hours all entrances will be kept unlocked. At all other times all outside doors will remain locked and should not be propped open. All students entering or leaving the building should ensure that the outside doors remain locked. The computer rooms and labs should always be locked when unoccupied.

Parking

Ample parking is available. Parking on campus requires a permit that can be purchased at Parking Services (656-2270).

Emergencies

The Clemson University Police Department (656-2222) is to be called for all major emergencies: fire, medical, police. They will ensure that the proper authorities are dispatched.

- In case of tornado warning, take appropriate shelter. Use stairwells; **do not** use the elevators.
- In case of fire, exit the building immediately. Use stairwells; **do not** use the elevators.

Desks

It is the goal of the Department of MSE to provide a desk for each graduate student. However, due to the limited available space, it may not be possible to accommodate each student. Therefore, a priority system is used that first assigns a desk to each graduate assistant and graduate fellow, then to each unsupported M.S. thesis student. Remaining desks are allocated to all other students on a temporary use basis.

NOTE: Study facilities for graduate students are intended solely for studying and interacting with students. They are not to be used for socializing or temporary housing. Students abusing these privileges will forfeit them.

Room Use Policies

Certain classrooms and conference rooms are to be used by reservation only. For classroom reservations contact the Program Manager. To reserve the department's conference room, Surrine 158, contact an Administrative Assistant in Surrine 161.

Computer Laboratories

Well-equipped computer laboratories maintained by Clemson Computing and Information Technology (CCIT) are located throughout campus. Visit their website www.clemson.edu/ccit for locations, help, details, and computing short courses

Office Supplies

The department does not furnish office supplies to graduate students for personal use. The faculty advisor must authorize all research contract-related use of office supplies, including letterhead stationery.

Mail

All personal mail is to be directed to the student's home address. The department is not to be used as one's mailing address. Outgoing mail, both U.S. and campus mail, can be placed in the appropriate receptacle in the reception areas.

MSE Copy Machines

Teaching assistants required to make copies for class may use this machine with an account number specific to the course provided by the instructor. Otherwise, department copy machines may not be used for personal copies.

MSE Seminars

During the fall and spring semesters, the Department of MSE sponsors a weekly seminar. Students and faculty give presentations about their research or other topics of interest to the department. Invited speakers from industry, government, and other academic departments are also included. All students are required to attend the seminars and faculty is expected to attend. If a student cannot attend a particular seminar, s/he should inform the seminar course coordinator ahead of time. The MSE curriculum requires that all students enroll for this seminar course each semester.

Fax Machines

Students may use the department facsimile machines for official MSE business purposes with authorization from their advisor.

Telephones

Graduate students making research-related long distance calls at the request of an advisor should use the advisor's nine-digit authorization code. Students are authorized to place long distance telephone calls only with the permission of the appropriate advisor or with their own personal calling card.

Telephone Numbers to Know

Registration Services (E-205 Martin Hall)	656-2305
Graduate School Office Admissions (Sikes Hall)	656-3195
Enrolled Student Services (E-209 Martin)	656-5339
International Student Services (Long Hall)	656-3614
Payroll Office (Adm. Service Bldg.)	656-5585
Student Development (707 Edgar Brown University Union)	656-2582
Graduate Student Govt. (702 Edgar Brown University Union)	656-2697
CCIT Computer Center (Ground Floor of Student Union)	656-3494
Campus Police (Orange Aid Building, near Gate 10)	656-2222
Student Locator (Edgar Brown University Union)	656-3311

Files

Graduate students should not access department files. Students should contact the Program Manager if they need information from an MSE file.

Photos

At the start of each semester, photos of beginning students are taken for the MSE directory, and also, more importantly, for the potential recommendations later in life.

MSE Library

The department libraries located in both 158 Serrine Hall and 204 Olin Hall are available for use by all students, staff and faculty of the Department of M&SE.

Receiving Supplies

Supplies will normally be delivered to 161 Serrine Hall. When they are checked in, the student's name will be indicated on the outside of the package. It is helpful to the Administrative Assistant receiving supplies if students let them know they are expecting a package(s).

Note: Do not pick up any box that has not been checked in.

Recycling and Resource Recovery

MSE faculty, staff, and students, out of a spirit of environmental sensitivity, collect and recycle materials when possible.

Professional Memberships

Students are encouraged to join professional organizations serving the Materials Science and Engineering community. Application forms for membership in various Materials Science & Engineering professional organizations may be obtained from appropriate faculty or online through the organization websites.

Local Graduate Chapters include:

Materials Research Society (MRS)- Dr. Thompson Mefford (mefford@clemsun.edu)
Optical Society of America (OSA)- Dr. Stephen Foulger (foulger@clemsun.edu)

Student Travel Overview

Department-specific travel information and guidelines from the Clemson University Travel Policy and Guidelines have been incorporated into this section. The complete Policy and Guidelines, including authority references and guidelines specific to university administration, is available at www.clemson.edu/finance/procurement/travel/studentguidelines.html, under the "Travel" tab in the sidebar. Any questions regarding travel should be directed to the Administrative Assistant in charge of travel in 161 Surrin. Summarized MSE procedures are as follows:

1. Complete "Request to Travel" form, obtain appropriate signatures (faculty member responsible for the account number to which it will be charged) and submit to the Administrative Assistant.
2. Enter travel status according to guidelines outlined herein.
3. Upon completion of travel, complete Travel Worksheet, obtain appropriate signatures, and submit to the Administrative Assistant for reimbursement.

Note: Hardcopies of all travel forms are located in the copy/work room in 161 Surrin. If students have trouble using the electronic forms, please see one of the Administrative Assistants for assistance.

Student Traveler's Responsibilities

When individuals file for reimbursement of travel expenses they are stating:

- They have followed the University's travel policies;
- They have not nor will not receive reimbursement for these expenses from any other entity outside the University;
- None of the expenses are of a personal nature;
- All supporting documentation is on file with the department.

Under the Progressive Discipline Policy of the University, any employee who falsifies records or documents or willfully violates written rules, regulations or policies can be suspended or terminated from his/her job.

Reimbursement will be made upon completion of the travel. All travel vouchers must be submitted within the same fiscal year (July 1-June 30) in which the trip occurred.

All travel vouchers submitted for reimbursement are required to have the signature of the traveler and one other person authorized to spend funds from the account numbers that

appear on the travel voucher. All signatures must be original. No stamped signatures will be accepted.

Travelers are expected to exercise the same judgment when making travel arrangements and expenditures that a prudent person would exercise if traveling on personal business and expending personal funds. Excess costs, circuitous routes, delays or luxury accommodations unnecessary or unjustified in the performance of an assignment are not considered exercising prudence.

Travel by commercial airlines will be in coach or tourist class.

Transportation to or from points of arrival and departure will be by the most economical method.

Expenses for Spouses or Other Individuals when Student Travels

Reimbursements to an individual may cover only those expenses pertaining to that individual. It may not include expenses pertaining to other individuals, regardless of who paid the expense. Travel expenses for spouses, friends, or other individuals not traveling on official University business are not reimbursable.

Unauthorized Travel Costs

Employees will be responsible for unauthorized costs and any additional expenses incurred for personal preference or convenience. No reimbursement for reduced fare advance purchase tickets charged on a personal credit card will be made to employees prior to the completion of travel since direct payment by CU is available using the department purchase card.

Travel Meals

Maximum expense reimbursement rates are variable. There are two maximums: first, for official travel within the State of South Carolina; second, for official travel outside of the State of South Carolina. See the Administrative Assistant for current, applicable maximums.

When the daily limit for meals is exceeded due to the cost of an official banquet, the excess will be allowed provided that a receipt and proper explanation for the banquet charge accompanies the travel voucher.

If an individual on non-overnight travel receives reimbursements for meals, this amount could be considered income and be reported on their W-2 tax form. For instance, meals on day trips are subject to tax withholding except when a business purpose for the meal can be documented. If claiming reimbursement for such business meals, documentation should include the name and affiliation of the person sharing the meal and the nature of the business discussed.

An individual must be in travel status (more than 10 miles from their residence or official headquarters) to be eligible for reimbursement of meals.

Travel Lodging

Lodging expenses will be allowed subject to the following limitations, provided an original, itemized receipt is furnished. Lodging arrangements and any required deposits are the responsibility of the traveler and will be reimbursed as part of the travel expenses upon completion of the trip.

Actual lodging expenses will be reimbursed; however, the more moderately priced accommodations must be requested when a choice is available. Employees should request a state or government rate when available.

No reimbursement will be made for overnight lodging within 50 miles of the employee's official headquarters or residence.

The expense for shared lodging may be reimbursed to one employee if only one original itemized receipt is obtained. If the room is shared with someone other than a University employee, the single room rate will apply.

All necessary and reasonable tips for baggage handling will be reimbursed.

Travel Miscellaneous Expenses

Movies, bar bills, laundry, room service, safes and security insurance, health or spa fees, etc. will not be subject to reimbursement on the travel expense report. These are considered personal in nature and should be paid by the traveler.

Foreign Travel

Travel outside the continental United States, Alaska, Hawaii, Canada, Puerto Rico or the Virgin Islands requires approval prior to departure. A Foreign Travel Request must be filled out and approved before travel. Foreign travel funded from sponsored program activities must be approved in advance by Sponsored Programs Accounting.

While on foreign travel, actual lodging expenses will be reimbursed. Fees for the purchase of traveler's checks, passports and visas will be reimbursed provided a receipt is furnished. All expenses claimed must be converted to U.S. dollars and the conversion rate and computation should be shown on each receipt.

When an employee is on foreign travel, meal expenses not exceeding federal rates will be reimbursed. These rates are listed by country under the "Per Diems" tab at: www.state.gov/travelandbusiness/

Travel by Automobile

Automobile transportation may be used when common carrier transportation cannot be arranged satisfactorily, or to reduce expenses when two or more University employees are traveling together.

University employees may use their own automobile for official travel provided the University would incur no added expenses above that of other forms of transportation available. See the Administrative Assistant for current mileage rates for personal vehicles.

Taxi fares and reasonable tolls will be reimbursed to the individual. Receipts must be furnished if claiming airport, hotel or parking garage parking of more than \$5.00.

No reimbursement will be made to operators of state owned vehicles who must pay fines for moving or non-moving violations.

Travel by Rental Cars

The contract for Rental Cars varies from year to year. Please check with the Administrative Assistant in charge of travel before renting a car. If there is no rental agency on state contract, students are encouraged to shop *cost efficiently* for a rental car just like for anything else. Charges for automobile rental are allowed when it is more economical than alternative methods of transportation or is the only practical means of transportation.

If it is necessary to rent an automobile while in travel status outside the United States, it is recommended the collision damage waiver insurance be obtained. The charge and the applicable tax will be included on the automobile rental statement submitted with the request for reimbursement. **DO NOT obtain additional coverage while in travel status inside the United States.**

Conference/Convention Registration Fees

Registration fees in the amount necessary to qualify individuals to attend conventions, meetings, conferences, etc. can be reimbursed from research advisor or department funds if approved prior to departure. These fees can be paid using the department purchase card or by completing a Direct Purchase Voucher and sending it to Accounts Payable ten days to two weeks before the deadline of the meeting. If registration fees are not prepaid, and rather are paid at the time of the meeting registration, reimbursement will be made after the trip is completed.

Receipts

Students must submit a receipt per expenditure of \$5 or more, except for meals, tolls and portage. All receipts and paid bills should be originals. If originals are not available, a memorandum, approved at the next level in the approval process, must accompany the travel voucher when it is submitted.

Final Checkout

Graduate students leaving for any reason should do as follows:

- Turn in all keys to current key manager (see “Quick Reference Guide”)
- Return all equipment and supplies to appropriate locations
- Clean assigned laboratory space
- Clean assigned office space
- Submit an electronic version of the thesis or dissertation
- Return all books and journals to the department library
- Inform the Program Manager of the impending departure and schedule an exit interview

No student will be cleared to leave until these procedures have been completed.

GENERAL SAFETY AND HEALTH POLICIES

The MSE Dept. takes the health and safety of its students, staff and faculty seriously. All students, staff and faculty are to follow the standards outlined by the Clemson University Office of Research Safety. The following are excerpts of those policies that the faculty have chosen to highlight.

Chemical Hygiene Plan

The chemical hygiene plan is designed to explain the roles and responsibilities of each person that works in a Clemson University laboratory. The plan also gives an overview of Clemson University's safety program. The document is required reading for all lab workers. Once the plan is read, an acknowledgement sheet must be signed and filed. Any questions regarding this should be directed to the research advisor. New students will attend a safety seminar at the beginning of the fall semester each year. This will be conducted by MSE faculty and staff.

Training

According to many governmental agency requirements, training must be taken by people that work in laboratories. The training required depends on what work is being done in the lab. All training modules are available at the Office of Research Safety website (<http://clemson.edu/research/safety>). Training should be completed before beginning work in the laboratory.

- Working with chemicals requires Chemical Hygiene Training
- Generating any chemical waste requires Hazardous Waste Training
- Working with biohazardous agents requires Biosafety Level 2 training
- Generating biological waste requires Biohazardous Waste Management training
- Work with blood or other potentially infectious materials requires Bloodborne Pathogen training (must be live initially)

Additional training is also required for working with any ionizing radiation or lasers.

Laboratory Operating Policies

Most of the rules for working safely in the laboratory are covered in the Chemical Hygiene Training, but there are some additional rules for working in MSE. There are also some rules from the training the faculty has chosen to highlight:

- No food or drink is to be brought into or consumed in any laboratory.
- To facilitate cleaning, nothing is to be stored on laboratory floors.
- No protective gloves can be worn outside of the laboratories (i.e. hallways, offices, etc.)
- Only scientific charts and similar educational or reference materials are to be hung from laboratory ceilings or walls.
- Suitably sized posters or photos may be affixed to walls using non-damaging tape or hangers.
- Nothing is to be affixed to the laboratory doors.
- No laboratory doors including the exterior doors are to be propped open.
- Nothing, including carts, is to be stored or left in the hallways.

- All laboratory chairs are to be cleaned weekly, more frequently if required.
- All laboratories are to be left clean and orderly prior to departing for the day.
- When conducting wet research in the laboratories, plastic containment trays are to be used, insofar as possible, to capture spills.
- All samples, bottles, standards, etc. are to be dated and identified as to contents and person responsible. The contents are to be properly disposed of and the bottles cleaned when no longer needed.
- Safety Data Sheets (SDSs) should be requested from chemical vendors. These need to be kept in the lab where the chemical is stored.
- Chemicals in the laboratory should be segregated and must be safely stored.
- A record of use is to be maintained for all hazardous chemicals in laboratory.
- All analytical balances are to be left clean after each use.
- Avoid working alone in a building; do not work alone in a laboratory if the procedures being conducted are hazardous.
- Lights are to be turned off whenever vacating a room.
- All memos, notices, etc. are to be posted on the official bulletin boards.
- All areas are to be maintained clean and free of refuse.
- All refuse that cannot easily be placed in a trash receptacle is to be carried to and placed in the appropriate dumpster.
- Key codes to all doors are to be kept strictly confidential within the MSE community. Any hint of a breach in confidentiality is to be reported immediately.
- Recycled paper and cans are to be placed in the appropriate containers.

Personal Protective Equipment (PPE)

PPE is used to protect workers from exposure to hazards. Common PPE used in the laboratory includes safety glasses (or splash goggles), lab coat and gloves. Additional PPE may be required based on the hazards present. All PPE must meet OSHA requirements.

PPE used in the lab depends on the hazards present. Minimum attire required for being in the laboratory (including visitors) is long pants, closed-toe shoes and safety glasses (or prescription glasses with side shields) unless an exception is made by the appropriate department representative. If hazardous chemicals or biohazards are used, then lab coats and gloves compatible with the hazardous materials being used are also required.

Additional information for PPE can be found at the Research Safety website.

Hazardous Waste Management

As mentioned above, anyone that generates any chemical waste must take hazardous waste training. Many labs in MSE generate chemical waste. Failure to adhere to the EPA and DHEC regulations regarding chemical waste disposal can lead to stiff fines to the university. Refrain from disposing of chemical in the trashcan or down the drain. Follow the directions given in both the Hazardous Waste Training and the MSE Hazardous Waste Management Plan for proper disposal of chemicals. Questions about disposal should be directed to the faculty advisor.

Emergency and Accident Procedures

While following the safety rules and guidelines can help provide a safe working environment, accidents can and will still occur. It is very important that faculty, staff and students be aware of procedures in the event of an emergency. A list of potential emergencies/accidents is given below with instructions on how to proceed in each scenario.

Fire: Faculty, staff and students are not encouraged to fight fires. Only fires in which hazardous chemicals are not involved AND which are very small may be extinguished using a fire extinguisher. If the nature of the fire is not known or if the fire is not very small, exit the building and pull the fire alarm when exiting. When the fire alarm sounds all personnel in the building should meet in **Trustee Park (across the street from Olin Hall)**. **Since we are located in many buildings on and off of campus, please refer to the specific building fire evacuation plan.** While fire alarms should be located near every exit from the building, if one is difficult to find, call 911 to report the fire.

Chemical or Biohazardous Material Spill: Cleanup of spill should only be done by personnel that are comfortable doing so. Do not clean up a spill of unknown materials. If a chemical or biohazardous material is spilled the first concern is decontamination of personnel. If it is spilled on a person, remove clothing on which the spill occurred and, if necessary, use the safety shower. Once all personnel are safe, contain the spill to be sure it does not go into drains or leave the immediate area. This can be done by surrounding the spill with absorbent material. Last, clean up the spill. The spill residues should be collected for pick up by Research Safety.

For large spills or spills of unknown origin (if the nature of the spill cannot be determined by asking other lab personnel), call 911 to report the spill. Clemson University's HAZMAT team will respond to clean up the spill.

Injury or Other Medical Emergency: If a serious injury or other medical emergency occurs, call 911 to be taken to the nearest emergency medical facility. For minor injuries, report the injury to your supervisor and report to Redfern. Your supervisor or the Administrative Assistant will call Risk Management to report the injury so that Compendium (Clemson's workman's compensation insurance) can be contacted. All injuries should be reported to your supervisor who must then contact Risk Management, even if you do not seek medical attention. If the accident involves a chemical or chemicals, obtain a copy of the MSDS if possible. If the accident involves a biohazard, make sure the treating physician is aware of the nature of the biohazard.

Working safely is the responsibility of everyone. OSHA requires that a workplace free from recognized hazards be provided for all workers. If, at any time you feel a situation is unsafe you may contact Mr. Jae Lowe or the Office of Research Safety. Your time and abilities are valuable so your safety and health are a top priority.

PURCHASING PROCEDURES

Purchasing Chemicals

All students will follow this procedure for purchasing chemicals and supplies.

Introduction to Purchasing

Advisors must approve orders for all research supplies and equipment required by MSE. An Administrative Assistant in 161 Sistine orders general office supplies, books, etc. Students may contact vendors in order to obtain prices, availability, technical help, or other information but may not place the order. Purchase orders (telephone orders) are limited to \$2,500 and under including freight and special handling, but excluding tax. Any order that exceeds \$2,500 (Purchase Requisitions) must be put on a Purchase Order and sent to the University Purchasing Department. All chemicals or supplies are to be ordered from primary vendors, if possible.

Primary Vendors

The State of South Carolina has awarded contracts for laboratory equipment and supplies to the following: **VWR Scientific Products**; and **Fisher Scientific Company** (limited items).

Purchase Orders and Purchase Requisitions

Any student wishing to order laboratory supplies, equipment, etc. must use Clemson buyWays. Detailed information is available in a handout located in Sistine 161 as well as at: <https://solutions.sciquest.com/apps/Router/Login?OrgName=Clemson&tmstamp=1374688582792>.

GENERAL UNIVERSITY INFORMATION

Graduate Student Government

The Clemson University Graduate Student Government (CGSG) is the official representative of the Clemson University Graduate Students. The goals of CGSG are to increase student involvement, enhance the educational opportunities for all graduate students through collaboration and professional development, and to provide opportunities for graduate students to succeed both academically and professionally. Prior to the beginning of the fall semester, MSE Senators are selected with input from the president of the Materials Research Society. The biweekly senate meetings are open to all graduate students.

R.M. Cooper Library

Located on campus adjacent to the reflecting pool, the main library (R.M. Cooper Library) *is replete* with MSE related books and journals. Your student ID is your library card. You can check out up to 200 items at a time, but only 3 journals at a time for 3 days maximum. Most books can be checked out for 6 weeks. To avoid late fees, books can be renewed in person or online via My Library Account. You can pay fines online using TigerStripe, a debit card, or a credit card; or pay in person using TigerStripe. The Library is cashless. The Library's catalog is online and is available at <http://libcat.clemson.edu>. Many books are available from the catalog, as well as access to electronic books and journals. If you are off-campus, it is best to go through the VPN (Virtual Private Network). The Library also subscribes to many databases to identify and provide access to journal articles. This Library Guide for MSE compiles many of these resources in one place. In addition to all of these resources, a Reference Librarian – Jan Comfort – is assigned to Materials Science and Engineering. It is a good idea to make an appointment to meet with her to review strategies for your individual research.

Fike Recreation Center

Graduate assistants can use these facilities. Lockers are available at the recreation center.

Sporting Events

Graduate students may purchase season tickets for Clemson football and basketball games. If interested, students should report to the ticket office in IPTAY/ticket office complex (Gate 9, Memorial Stadium) to complete an application. Further information can be obtained from the ticket office, 656-2118. Baseball games are free with university ID. Tickets for soccer games may be purchased at the gate (discounts with university ID).

Counseling and Psychological Services (CAPS)

CAPS is the University's only facility for personal counseling, psychological testing, outreach and consultation. These services are typically covered by the graduate student insurance and are completely confidential. The primary mode of accessing Counseling and Psychological Services is through the CUNow Clinic. Students are asked to complete the initial paperwork (takes about 15 minutes) and then are seen for a brief initial session. Through an administrative process, each student's case is reviewed and assigned to a primary counselor. That counselor will then contact the student by phone and schedule an appointment for a diagnostic interview. At that time, the student's needs are assessed and a

treatment plan developed that focuses on the student's strengths and addresses the presenting problem.

Student Disability Services (SDS)

MSE is committed to assisting all students in making their college experience successful and positive. If any graduate student has documented disabilities, SDS will help coordinate the provision of reasonable accommodations (text to voice, extended time, etc.). If a student would like to discuss testing for identifying a disability, then SDS can help the student identify resources. Please note that any diagnosis (with appropriate documentation) could be considered a disability if it has a severe impact on the student's performance (this could include ADD, diabetes, learning issues, mobility issues, etc.).

Military Leave

The Graduate School has ruled that a graduate student on military leave will not receive a stipend for the period of that leave. Students planning to take military leave should notify the Administrative Assistant of the inclusive dates. Short periods of approximately one week can be taken as regular vacation with no interruption in pay. Students leaving the campus for six weeks to attend summer camp must obtain written permission from the Dean of the Graduate School to be excused from the continuous enrollment provision.

Campus Parking

Parking on campus is restricted and requires a permit that can be purchased at Parking Services, located in G-01 Edgar Brown University Union (656-2270).

T.A. ASSESSMENT

Teaching Assistant / Grader Appraisal Form Department of Materials Science and Engineering Clemson University

INSTRUCTION

1. At the beginning of the semester, instructors should review this evaluation form with each of their TAs and graders, indicating their expectations of the TA or grader.
2. Instructors should complete a copy of this form for each TA/grader at the conclusion of the course to the student services coordinator and provide a copy of the completed form to the TA / grader when all TA / grader duties have ended. The feedback is intended to enhance teaching performance.
*Instructors complete page 1-3
TA complete page 4*
3. Instructors who become aware of serious problems with the performance of a TA / grader should not wait until the end of the course to address those problems but should discuss them with the TA / grader as soon as possible.

Course Number and Title

<hr/>	<hr/>
Instructor	Teaching Assistant / Grader

<hr/>	<hr/>
Number of hours of TA/grader employment	Is this the TA's or grader's first appointment?

<hr/>	<hr/>
TA or grader's main duties (e.g., marking, meeting students, conducting tutorials, running labs)	
<hr/>	
<hr/>	

RATING OF TA EFFECTIVENESS

Keeping in mind the expectations that you communicated to the TA / grader at the beginning of the semester, rate the TA / grader's performance in each of the categories below. Use the following scale:

- 1 = Exceeds expectations
- 2 = Meets expectations
- 3 = Does not meet expectations
- NA = Not applicable
- NO = No opportunity to evaluate

Reliability:

Regularity of attendance at course planning/coordinating meetings (if such attendance is a job requirement) _____

Quality of contributions to course planning/coordinating meetings _____

Regularity of attendance at course lectures (if such attendance is a job requirement) _____

Availability to students during office hours _____

Proficiency: Understanding of material covered in the course _____

Communication: Effective communication with students _____

Judgement: Good judgement in dealings with students _____

Tutorials/labs:

Effectiveness in tutorials/labs _____

Preparation of tutorial/lab material/assignments _____

Constructing assignments/tests/exams

Contribution to development of paper/homework assignments _____

Contribution to preparation of test/exam questions _____

Grading:

Accuracy and timeliness of grading written assignments _____

Accuracy and timeliness of grading tests/exams _____

Quality of feedback/comments on written assignments/tests _____

Test/Exam Invigilation: Effectiveness as test/exam invigilator _____

Overall rating of TA / grader effectiveness: _____

Instructor's comments on the TA or grader's performance in your course:

Instructor's signature

Date

Distribution, and retention, of completed appraisal forms:

Instructors should complete pages 1-3 of this TA/grader Appraisal form to the student services coordinator, and provide a copy of a completed TA / grader Appraisal form to each TA / grader, when all TA duties have ended. This should be done as soon as possible but in any case no later than the end of the first week of classes of the following semester.

Teaching assistant / grader's comments:

TA / grader's signature

Date

Distribution, and retention, of completed evaluation forms:

A TA receiving a completed TA / grader appraisal form should sign the form at page 4, providing comments if so desired, and return the copy of the completed form with page 4 of this form to the student services coordinator no later than five working days after receiving it. Once received the student services coordinator will submit the form to the Department Chair.

Thesis M.S. Student Checklist

If you are in the MS program, please complete/update the following table.

	WHAT	WHEN	HOW/WHO	DATES (fill these in yourself, for your own record)
1	Selection of research advisor	Before the end of the 1 st semester	Notify Graduate Program Coordinator and Program Manager	
2	Appointment of advisory committee	By the end of the 1 st semester	In consultation with research advisor	
3	Preparation of plan of study	By the end of the 1 st semester	In consultation with research advisor and committee	
4	Filing of plan of study	By the end of the 1 st semester	Student submit GS2 via iRoar	
6	Advisory committee meeting before defense	~ six months before final examination (or consult your advisory committee)	In consultation with research advisor and committee	
7	Apply for Graduation and Diploma	(Current deadlines can be found on the Graduate School website)*	By student via iRoar	
8	Cap and Gown Rental	Early during semester in which degree is to be conferred (see website)*	By student	
9	Submittal of Thesis (draft)	Submit your draft thesis to advisor for revision and approval before submission to the advisory committee. (Allow sufficient time; In consultation with advisor)	By student with review by research advisor	
10	Submittal of Thesis (semi-final)	Submit a semi-final version of thesis (approved by the advisor) to the committee at least two weeks before final examination or consult your advisory committee	By student with review by research advisor GS7-M Form to be filed by advisor after examination is completed.	

11	Thesis Defense	At least three weeks prior to date on which degree is expected (see website)*	Student should keep one copy, submit one to the Program Manager, and Enrolled Services.	
12	Approval of thesis by Graduate School	About two weeks before graduation (see website)*	By student	
13	Final Checkout (please refer to p. 48)	Before graduating or before leaving Clemson	By student	
14	Duplication of thesis	At least two weeks before graduation (see website)*	By student	

* Graduate School Deadlines website: www.clemson.edu/graduate/students/deadlines.html

Non-Thesis M.S. Student Checklist

If you are in the MS program, please complete/update the following table.

	WHAT	WHEN	HOW/WHO	DATES (fill these in yourself, for your own record)
1	Selection of research advisor	Before the end of the 1 st semester	Notify Graduate Program Coordinator and Program Manager	
2	Preparation of plan of study	By the end of the 1 st semester	In consultation with research advisor and committee	
3	Filing of plan of study	By the end of the 1 st semester	Student submit GS2 via iRoar	
4	Apply for Graduation and Diploma	(Current deadlines can be found on the Graduate School website)*	By student via iRoar	
5	Cap and Gown Rental	Early during semester in which degree is to be conferred (see website)*	By student	
6	Submittal of Publishable Paper	Submit your draft to your advisor for revision and approval. (Allow sufficient time; In consultation with advisor)	By student with review by research advisor	
7	Submission of GS7-M	About two weeks before graduation (see website)*	By student with review by research advisor GS7-M Form to be filed by advisor after all requirements are completed. Student should keep one copy, submit one to the Program Manager, and Enrolled Services.	
8	Final Checkout (please refer to p. 48)	Before graduating or before leaving Clemson	By student	

* Graduate School Deadlines website: www.clemson.edu/graduate/students/deadlines.html

Ph.D. Student Checklist

If you are in the Ph.D. program, please complete/update the following table.

	WHAT	WHEN	HOW/WHO	DATES (fill these in yourself, for your own record)
1	Selection of research advisor	Before the end of the 1 st semester	Notify Graduate Program Coordinator and Program Manager	
2	Appointment of advisory committee	By the end of the 3 rd semester	In consultation with research advisor and committee	
3	Preparation of plan of study	By the end of the 3 rd semester	In consultation with research advisor and committee	
4	Filing of plan of study	By the end of the 3 rd semester	Student submit GS2 via iRoar	
5	Comprehensive exam: written proposal	After completion of four (4) core classes (see page 22)	Apply to Graduate Standard Committee Chair who will appoint Comprehensive Exam Committee to be responsible for proposal review.	
6	Comprehensive exam: oral exam	After written proposal is accepted	Comprehensive Exam Committee	
7	Admission to Doctoral Candidacy	After completion of Comprehensive Exam	GS5 Form to be completed by Comprehensive Exam Committee	
8	Dissertation committee meeting before defense	Typically ~12 months (at least six months) before final examination (or consult your dissertation committee)	In consultation with research advisor and committee	
9	Apply for Graduation and Diploma	(Current deadlines can be found on the Graduate School website)*	By student via iRoar	

10	Cap and Gown Rental	Early in semester during which degree is expected to be conferred (see website)*	By student	
11	Completion of draft of dissertation	Submit your draft dissertation to advisor for revision and approval before submission to the advisory committee. (Allow sufficient time; In consultation with advisor)	By student with review by research advisor	
		Submit a semi-final version of dissertation (approved by the advisor) to the committee at least two weeks before final examination or consult your advisory committee		
12	Dissertation Defense	At least three weeks prior to date on which degree is expected (see website)*	GS7-D Form to be filed by research advisor after examination is completed. Student should keep one copy, submit one to the Program Manager, and Enrolled Services.	
13	Approval of dissertation by Graduate School	About two weeks before graduation (see website)*	By student	
14	Final Checkout (please refer to p. 48)	Before graduating or before leaving Clemson	By student	
15	Duplication of dissertation	At least two weeks before graduation (see website)*	By student	

* Graduate School Deadlines website: www.clemson.edu/graduate/students/deadlines.html