

Materials Science & Engineering



Graduate Handbook
2006-2007

1. Introduction

The Department of Materials Science & Engineering offers graduate students the opportunity to conduct state-of-the-art research under the supervision of world-class faculty while pursuing Master of Science or Doctor of Philosophy degrees in the discipline.

Research areas include:

| | | |
|--------------------------------|---------------------------------|-------------------------|
| Biomaterials | Biomedical Applications | Biomimetics |
| Ceramics | Characterization | Computational Materials |
| Corrosion | Deformation & Fracture | Devices |
| Electronic Materials | Fibers & Mixed Systems | Fuel Cells |
| Hydrogen Production | Materials Chemistry | Metals |
| Minerals | Nanomaterials | Nuclear Materials |
| Optical & Optoelectronics | Particle Science | Polymers |
| Processing & Synthesis | Semiconductors & Ferroelectrics | Sensors |
| Student Learning and Cognition | Surface Science | Thermodynamics |
| Thin Films | Tissue Engineering | Tribology |

2. Department Administration

| | | | |
|--|--|---|--|
| Kevin Jones Chairman 100B Rhines kjone@mse.ufl.edu 846-3301 | | | |
| Jack Mecholsky Assoc. Chair & Co-Grad. Coordinator 100D Rhines jmech@mse.ufl.edu 846-3306 | | Christopher Batich Co-Graduate Coordinator 317C MAE cbati@mse.ufl.edu 392-6630 | |
| <h3>Student Affairs Committee</h3> | | | |
| Jack Mecholsky SAC Member 100D Rhines jmech@mse.ufl.edu 846-3306 | Christopher Batich Co-Grad. Coordinator SAC Member 317C MAE cbati@mse.ufl.edu 392-6630 | Curriculum Chair or Representative In Students Specialization SAC Member | Martha McDonald Ex-officio SAC Member 108 Rhines mmcdo@mse.ufl.edu 846-3312 |

3. Arriving in the Department

- Stop by Academic Services Office (ASO) – See Martha McDonald, Doris Harlow, or Jennifer Horton (108 Rhines Hall) for entrance interview
 - Obtain a gatorlink e-mail account at <http://www.gatorlink.ufl.edu/>
 - Obtain a Gator1 ID card (go to the University Welcome Center & Bookstore)
 - Print advisement form at http://www.mse.ufl.edu/forms/grad_acad_advisement.pdf
 - Add yourself to the “Grad” and “All MSE” email lists at <http://support.mse.ufl.edu/metadot/index.pl?id=2086&isa=Category&op=show>
 - Complete the student information form at <http://www.mse.ufl.edu/currstudentinfo.php>
- Faculty Advisor – See your research advisor to assist in selecting your course registration. If you do not have an advisor when you arrive, see Dr. Jack Mecholsky (100 Rhines Hall) or Dr. Christopher Batich (317C Materials Engineering).
 - **Come by ASO to verify course hours and register for classes**
- Payroll – If you are receiving an assistantship or fellowship, please download and complete the employment package documents from our website: http://www.mse.ufl.edu/forms/employment_pack.pdf
 - Take completed documents to Joni Nattiel in the Payroll office (104 Rhines Hall). You must also provide:
 - Social security card
 - Picture ID; either driver’s license or state ID
 - Visa (for international students)
- Residency – If you are a U.S. citizen you should begin the process of applying for Florida residency prior to your first day of classes. Obtaining Florida Residency allows for a significant reduction in tuition and fees. Complete details and required forms for residency can be found at: <http://www.mse.ufl.edu/current/residency.php>. UF recommends the student complete the following:
 - Obtain Florida Drivers license (located at 5830 NW 34th Street)
 - Register to vote in Florida (http://elections.alachua.fl.us/voting_regisration.html)
 - Maintain proof of employment
 - Register your vehicle in Florida (3946 SW Archer Road or 12 SE 1st Street)
 - Open a local bank account
 - Attach a copy of your Federal Income Tax Return
 - Keep and maintain records of rental agreements, leases, and deposits on utilities
- Change of Residency
 - Complete “Request for Change in Residency Status”; you may download the form from the registrar: <http://www.admissions.ufl.edu/pdf/residencyreclass.pdf>
 - Bring originals or copies of the above documents to the ASO

4. Tuition Waivers, Fees, & Registration Requirements

Financially supported students (fellowships, assistantships, or sponsored research of a faculty member) may receive a tuition waiver.

- Register for the correct number of hours to avoid unnecessary late fees or delay of your tuition waiver. Check with ASO if you have any questions.
- Some students on funding are required to pay non-matriculation fees each term
 - Fees for 2005 – 2006 were:
 - \$38.05/credit hour for students who entered before Fall 2005
 - \$39.01/credit hour for students who entered after Fall 2005
 - For students on assistantships taxes will be withheld
 - **Pay your portion of fees before the fee payment deadline even if your tuition waiver has not been processed; this will insure you will not be assessed late payment fees**
- Graduate Insurance
 - Students on appointments will receive financial assistance toward health insurance from UF for Fall 2006
 - Must enroll in payroll deduction for insurance to be eligible
 - Insurance information may be found at:
<http://www.shcc.ufl.edu/insurance.shtml>
 - Spring 2007 a new plan will take effect
- Notify the Academic Services Office (ASO) after obtaining any type of funding
 - Graduate Research Assistantship (GRA)
 - External Fellowship

5. Curriculum Planning

The responsibility of every student's curriculum planning will rest on the student and his/her advisor/supervisor. If you have not joined a faculty member's group, then you will see Dr. Jack Mecholsky (100 Rhines Hall) or Dr. Christopher Batich (317 Materials Engineering) for advisement.

- Complete three MSE graduate core classes
 - EMA 6316, Materials Thermodynamics
 - EMA 6313, Materials Structures & Defects
 - EMA 6136, Diffusion, Kinetics, and Transport Phenomena
- Choose an area of specialization and pass a minimum of nine credit hours as designated for their specialty
 - Students will not be allowed to take a MSE core course more than twice
 - Students will not be allowed to retake a specialty class
- Register properly each semester
 - Download form: http://www.mse.ufl.edu/forms/grad_acad_advisement.pdf
 - Fill out advisement form and take to advisor/supervisor for signature
 - Bring completed advisement form to ASO for processing
 - Sign off on processed registration form

6. Academic Requirements: MS Thesis, MS Non-Thesis, PhD

General Requirements for all Graduate Students

- Ph.D. Students for whom English is not a native language will be required to take the Test of Spoken English (TSE) within their 1st month of enrollment in MSE
- All on-campus graduate students must register and attend the Graduate Seminar (EMA 6936) each Fall and Spring. (See the ASO for any exceptions)
- Only two courses (8 credits max) of EMA 6938 (Special Topics) are allowed to count toward a graduate degree
- Form Supervisory Committee no later than the end of your second semester of study or after 12 credit hours in order to be able to register for a third semester in MSE without a petition to the student affairs committee.

MS Thesis Degree

- Required Credit Hours: 30
- Required: 3 MSE Department Core Classes (EMA 6316 Thermodynamics, EMA 6313 Structures, EMA 6136 Kinetics) passed with minimum grade of C or better
- Required: 3 Specialty Core Classes with average grade of B or better, no grade below a C will be accepted
- Expected completion of core courses within 1st year
- Under special circumstances, students may petition to delay enrollment in these courses in order to remedy deficiencies in their undergraduate preparation, however, courses required for their specialty are expected to be completed by the end of their second year of enrollment. An approved plan of study is required.
- Maximum: One 3000 level or above undergraduate course (outside the Department)
- Maximum - 6 credit hours of EMA 6971 - Master's Research
- Maximum - 8 credit hours of EMA 6905 - Individual Work
- Maximum - 5 credit hours of EMA 6910 - Supervised Research.
- **Transfer credits** - by petition to the graduate school, up to 9 hrs. graduate level courses, B or better may be transferred to the MS program with approval by the graduate coordinator
- **Time Limitation** - all work, including transferred credits must be completed during the seven years immediately preceding the date on which the degree is awarded
- **Supervisory Committee – consultation with your Supervisory Committee as necessary is strongly encouraged**
 - Must have 3 members in MSE dept. by the end of the 2nd semester or after 12 credit hours; to form the committee, visit:
http://www.mse.ufl.edu/forms/grad_supervisory_committee_1.php
 - Turn in signed form to ASO
 - To change committee:
http://www.mse.ufl.edu/forms/grad_sup_comm_rem_form.pdf
 - Provide written confirmation to ASO from all faculty being added and/or removed
- **Thesis defense** - write and defend a written thesis acceptable to the Supervisory Committee and the Graduate School

- **Graduation** - go through a graduation check with the ASO by the end of your second term and another check the term before you expect to graduate
 - Apply for your degree by filling out a degree application within the first two weeks of the semester (two days if summer term) you plan on graduating
 - Comply with Graduate School rules, thesis/dissertation and final examination deadlines
 - Refer to the ETD website: <http://gradschool.rgp.ufl.edu/editorial/introduction.html> for submission information and current deadline dates
 - Register for a minimum 3 credits EMA 6971, MS Research, in final term for fall/spring graduation (2 credits EMA 6971 for summer)
 - Complete the departmental employment questionnaire and exit interview at http://www.mse.ufl.edu/forms/grad_graduation_certification_checklist.pdf and http://www.mse.ufl.edu/forms/grad_employment_questionnaire.pdf and return it to the ASO

Guidelines for MS Thesis Defense

- Graduate students must notify the ASO at least five days prior to any defense for preparation of the appropriate paperwork; use the form at: http://www.mse.ufl.edu/forms/grad_final_exam_form_ms.php
- Defense date
 - Supervisory Committee will examine the student
 - **Entire committee must attend**
 - Chair may not be substituted
 - One internal MSE member may be substituted if necessary
 - **On the day of the defense the student's file and faculty signature page must be picked up by a faculty member from the ASO and returned upon completion**
- Submit a completed and defended thesis per graduate school requirements and deadlines.
 - Requirements: <http://gradschool.rgp.ufl.edu/etd/editorial.html>
 - Deadlines: <http://etd.circa.ufl.edu/present/critical.html>

MS Non-Thesis

- Required Credit Hours: 30
- Required: 3 MSE grad core classes (EMA 6316 Thermodynamics, EMA 6313 Structures, EMA 6136 Kinetics) passed with minimum grade of C or better
- Required: 3 Specialty Core classes with average grade of B or better, no grade below a C will be accepted
- Expected completion of core courses within 1st year
- Under special circumstances, students may petition to delay enrollment in these courses in order to remedy deficiencies in their undergraduate preparation, however, courses required for their specialty are expected to be completed by the end of their second year of enrollment. An approved plan of study is required.
- Maximum: One 3000 level or above undergraduate course (outside the department)
- Maximum: 6 credit hours of EMA 6905 - Individual Work
- Maximum: 6 credit hours of S/U work (includes max. 5 hours of EMA 6910 - Supervised Research)

- **Transfer credits** – by petition to the graduate school, up to 9 hrs. graduate level courses, B or better may be transferred to the MS program with approval by the graduate coordinator
- **Time Limitation** - all work, including transferred credits, counted toward the master's degree must be completed during the seven years immediately preceding the date on which the degree is awarded
- **Supervisory Committee** – must have one member in MSE Dept. by the end of the 2nd semester or after 12 credit hours
- **Comprehensive Project/Paper** – Please visit ASO for information on this part of the MS Non-Thesis degree
 - Submit a brief, i.e., 1-2 pages, written document to ASO which describes how your research relates to materials thermodynamics, structures, kinetics and one of the selected topics of your major field
 - The exam will be graded by a faculty member of the Student Affairs Committee
- **Graduation** - go through a graduation check with the ASO by the end of your second term and another check the term before you expect to graduate
 - Apply for your degree by filling out a degree application within the first two weeks of the semester (two days if summer term) you plan on graduating
 - Indicate via e-mail to ASO whether your degree is terminal
 - Register for a minimum of 3 credits of coursework which will count towards your degree in final term for fall/spring graduation (2 credits in summer)
 - If the degree is terminal, complete the employment questionnaire and exit interview http://www.mse.ufl.edu/forms/grad_graduation_certification_checklist.pdf and http://www.mse.ufl.edu/forms/grad_employment_questionnaire.pdf return forms to ASO

PhD

- Required Credit Hours: 90 beyond the bachelor's degree
- Required: 3 MSE Core classes (EMA 6316 Thermodynamics, EMA 6313 Structures, EMA 6136 Kinetics) passed with minimum grade of B; student cannot take any core course more than twice
- Required: 3 Specialty Core classes with average grade of B or better; student cannot repeat any specialty course
- Expected completion of core courses within 1st year
- Under special circumstances, students may petition to delay enrollment in these courses in order to remedy deficiencies in their undergraduate preparation, however, courses required for their specialty are expected to be completed by the end of their second year of enrollment. **An approved plan of study is required.**
- In the event a student does not receive a grade of B or better in any of the three required departmental core classes, the student may retake the course the following year, but not for credit
- Students who receive a grade of B or better the second time may then proceed to the oral qualifying exam
- No student will be allowed to take a core course more than twice and no student will be allowed to retake a specialty class
- Maximum: Two 3000 level or above undergraduate courses (outside the Department)
- Maximum: 8 credit hours of EMA 6905 - Individual Work
- Maximum: 5 credit hours of EMA 6910 - Supervised Research

- **Transfer credits** - up to 30 hours of graduate level courses from a Masters degree at another university may be transferred and will count towards the PhD degree with approval of the PhD advisor and the graduate school. All work transferred must be B or better.
- **Time Limitation** - All work for the PhD must be completed within 5 calendar years after Admission to Candidacy or the examination must be repeated
- **Supervisory Committee** – must be formed by the end of the 2nd semester or completion of 12 credit hours. Consists of 5 members who hold graduate faculty status with the Graduate School.
 - **4 Internal MSE members**
 - Chair
 - 3 additional MSE graduate faculty
 - **1 external member; this individual can not hold MSE status**
- **Admission to Candidacy** – Three step process
 - **Oral Qualifying Exam**
 - **Approval of Dissertation Topic/Written Proposal to Committee**
 - **Oral Proposal Defense**
- **General Rules for Oral Qualifying Exam and Oral Proposal Defense**
 - **Time Limits:** after completing all core and specialty classes on a first pass, students must take the oral qualifying exam **within six months**
 - If required, core courses on a second pass and with the requisite specialty classes complete, the oral qualifying exam must be taken **no later than the first month of a student's sixth semester**
 - Generally students complete the two parts of the oral exams (qualifying exam and proposal defense) on the same day; however, at the discretion of the PhD advisor in consultation with PhD committee, the oral exams may take place on separate days. Both parts must be completed within the same semester
 - Both the oral qualifying exam and the oral proposal defense must be passed within two attempts
 - **All members of the student's entire Supervisory Committee must be present at both the oral qualifying exam and oral proposal defense**
 - **On the day of the exam the student's file and faculty signature page must be picked up by a faculty member from the ASO and then returned to the ASO on completion**
- **Oral Qualifying Exam**
 - Complete the on-line form at least five days prior to the defense, at: http://www.mse.ufl.edu/forms/grad_candidacy_form.php, which will notify ASO to prepare the necessary paperwork and all interested parties of the defense
 - The oral qualifying exam is administered by the student's entire Supervisory Committee. The Chair and External Member must be present but may not ask questions.
 - Each member of the Supervisory Committee, except the Chair and External Member, prepares one or more written problems for the Oral Exam. These written problems are given to the student to solve. Questioning by the exam members will help direct the student in solving the problem and/or may diverge from the problem to probe observed weaknesses. The written problems will be returned to the committee at the end of the exam.
 - The student will be evaluated on the following items:
 - Understanding and integrating basic principles relating to the student's research area; **ability to use the skills developed in the Core and**

- Specialty Curricula is required for this exam;** examiners are expected to question the student in sufficient depth to verify the student has a graduate level understanding in the areas listed on the examination form
- Generally the examination may last up to 2 hours
 - Examination will be graded pass/fail
 - A fail means the student must retake the oral qualifying exam no later than **the first month of the following academic semester**
 - This section of the exam may be passed independently of the proposal defense
- **Approval of dissertation topic and written proposal to committee**
 - Supervisory Committee **must approve** the topic **prior to the student preparing an original proposal**
 - The document should not exceed 20 printed pages and should be prepared with limited assistance from the Faculty Advisor
 - The proposal should include:
 - Objectives of research
 - Significance
 - Literature Background
 - Logical Plan of Attack
 - Description of Procedures/Methods, etc.
 - Description of Work Already Completed If Applicable
 - Timeline and Resources
 - **Oral Proposal Defense**
 - Prepare a 20-30 minute oral presentation of the research proposal
 - Demonstrate competency in a proposed field of research along with the ability to assimilate material from literature
 - Complete the on-line form at least five days prior to the defense, at: http://www.mse.ufl.edu/forms/grad_candidacy_form.php, which will notify ASO to prepare the necessary paperwork and all interested parties of the defense
 - **Defense date**
 - Supervisory Committee will examine the student
 - **Entire committee must attend**
 - **Chair and external may not be substituted**
 - Two internal MSE members may be substituted if necessary
 - **On the day of the defense the student's file and faculty signature page must be picked up by a faculty member from the ASO and returned upon completion**
 - If the student fails to defend the research topic adequately, he/she may be given 14 additional days to amend his/her proposal or may be assigned a new topic to be defended at the beginning of the next semester
 - A **reexamination by the Supervisory Committee** will be done at that time and the student will either be given a "pass or fail" on the second attempt; no additional attempts will be allowed
 - This section of the exam may be passed independently of the oral exam
 - **Exceptions to Requirements for Ph.D. Degree**
 - Students may petition not to take the required classes if they have taken similar courses elsewhere; students must still complete a minimum of 18 credit hours of EMA 5000-6000 level courses for their degree at UF
 - The decision to approve or deny the petition will be made by the SAC

- Students may petition to delay the oral qualifying examination until the end of their sixth semester if their enrollment at MSE is during the Spring or Summer
- Any delay of the proposal defense due to extenuating circumstances must be petitioned to the SAC for faculty vote
- **Admission to Ph.D. Candidacy**
 - After successful completion of the oral qualifying exam, topic approval and the oral proposal defense, a Ph.D. student will be admitted to candidacy
 - A course correction changing all EMA7979 hours to EMA7980 must be filled out with ASO and processed through the Graduate School and registrar
 - If this is done prior to the midpoint of the semester, that term will count as your first term of PhD study
 - Minimum of two semesters of EMA7980 is required to complete the degree
- **Graduation** - complete graduation check with ASO the term before you expect to graduate
 - Apply for your degree by filling out a degree application within the first two weeks of the semester (two days if summer term) you plan on graduating
 - Comply with graduate school rules and graduate school thesis/dissertation and final examination deadlines
 - Register for a minimum 3 credits of EMA 7980 Doctoral Research in final term for fall/spring graduation (min. 2 credits EMA 7980 for summer grads)
 - Complete the departmental employment questionnaire and exit interview at http://www.mse.ufl.edu/forms/grad_graduation_certification_checklist.pdf and http://www.mse.ufl.edu/forms/grad_employment_questionnaire.pdf and return it to the ASO

Guidelines for PhD Dissertation Defense

- Notify the ASO at least five days prior to any defense for preparation of the appropriate paperwork; use the form at: http://www.mse.ufl.edu/forms/grad_candidacy_form.php
- Defense date
 - Supervisory committee will examine the student
 - Entire committee must attend
 - Chair and external may not be substituted
 - Two internal MSE members may be substituted if necessary
 - **On the day of the defense the student's file and faculty signature page must be picked up by a faculty member from the ASO and returned upon completion**
- Appropriate deadline dates and rules for submission of the dissertation are listed by the Graduate School Editorial Office at: <http://gradschool.rgp.ufl.edu/etd/editorial.html>
- The student must also have two sets of original dissertation signature pages signed by the committee members in black ink
- It is the student's responsibility to obtain all of the signatures on the signature pages

Department Core Courses (Required)

| | | |
|--------------------------------|----------------------------|--------------------------|
| EMA 6316 (3) Thermodynamics | EMA 6313 (3) Structures | EMA 6136 (3) Kinetics |
|--------------------------------|----------------------------|--------------------------|

- core graduate courses will cover fundamental information relevant to all MSE specialties
- they will include examples from a wide variety of materials to ensure that all MSE graduate students are familiar with materials outside of their own specialty

Specialty Core Courses: 9 credit hours required in area of specialization as indicated below

Biomaterials:

EMA 6580 - Science of Biomaterials I (3)
EMA 6581C - Polymeric Biomaterials (4)
2 Hrs. 5000-6000 EMA courses

Ceramics: 9 Hrs. from below list:

EMA 6446 – Solid State Ionics (3)
EMA 6938 - Ferroelectric ceramics (3)
EMA 6319 - Applied colloidal & interfacial chemistry for engineers (3)
EMA 6448 - Ceramic processing (3)
EMA 6715 - Fracture of brittle materials (3)

Computational Materials Science:

9 Hrs. 5000-6000 level EMA courses

Electronic, Optical & Magnetic Materials:

EMA 6110 - Electron Theory of Solids I (3)
6 Hrs. 5000-6000 level EMA courses

Emerging Areas of Materials Science:

9 Hrs. 5000-6000 level EMA courses

Metals: 9 Hrs. from below list:

EMA 6518 - Transmission Electron Microscopy (3)
EMA 6326 - Topics in Corrosion (3)
EMA 6107 - High Temperature Materials (3)
EMA 6226 - Advanced Mechanical Metallurgy I (3)
EMA 6808 - Error Anal. & Optimization Meth. in Materials Res. (3)
EMA 6105 - Fundamental & Application of Surface Science (3)
EMA 6625 - Advanced Metals Processing (3)
EMA 6106 - Advanced Phase Diagram (3)
EMA 5000-6000 level courses taught by Dr. Phillpot
(to be added at a later date)

Polymers:

EMA 6165 - Polymer Physical Science (3)
EMA 6461 - Polymer Characterization (3)
3 Hrs. 5000-6000 level EMA courses