DEPARTMENT OF

materials science & ENGINEERING

GRADUATE HANDBOOK

Revised 9/2017

UCONN

www.mse.engr.uconn.edu

On behalf of the faculty and staff of the Materials Science & Engineering Graduate Program, welcome to the University of Connecticut. We hope you will have an enjoyable and intellectually stimulating experience, both in our program and at UConn, for the duration of your graduate studies.

You are a member of a highly capable, highly motivated, and highly select group of students. We are confident that you will find your graduate colleagues to be engaging, and your interactions with them will prove an invaluable component of your professional and academic growth, now and long into the future.

We know that new students will have questions upon entering our program. This handbook provides answers as well as resources, regulations, and procedures, all based on what we believe works best for most students.

It is the responsibility of all graduate students to understand and fulfill the specific requirements of their degree, as outlined in this handbook. A faculty advisor will facilitate this process. He or she will be your primary source of counsel regarding your academic program. Information on the research interests of our faculty members, as well as the spectrum of research activities available to you as a graduate student, is summarized in this handbook but as always is most up to date on the department website.

The faculty and staff of UConn's Materials Science & Engineering Department are pleased to welcome you, and look forward to interacting with you both inside and outside the classroom.

Sincerely,

S. Pamir Alpay
Department Head

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MASTER'S DEGREE

Two approaches are offered for individuals seeking to obtain a Master of Science (M.S.) degree: Plan A and Plan B. Plan A emphasizes research and is usually pursued by full-time graduate students. Plan B emphasizes coursework but is rarely applicable. For part time or more course-based programs, the M.Eng. degree is most common as it provides an excellent balance of depth and flexibility.
The specific requirements for each plan are outlined below. Any other general rules and regulations for the Master's degree, as established by the Graduate School in the latest Graduate Catalog, shall also apply.

Plan A: The Thesis Option
The main requirements of this plan are as follows:

1. The student must successfully complete 7 graduate courses (21 credits), maintaining a GPA of 3.0 or above. At least 5 of these courses must be MSE courses. The student must also complete at least 9 credits of Master's Thesis Research (GRAD 5950).
2. The student must file a Plan of Study with the Graduate School. This plan must be approved by the student's Advisory Committee and the Executive Committee of the Graduate Faculty Council. The student must prepare and orally defend a research thesis.
3. Each student shall select his/her own Advisory Committee. This committee must consist of one Principal Advisor and two Associate Advisors. The Principal Advisor and one Associate Advisor must be members of the graduate faculty in the Materials Science and Engineering field. One of the Associate Advisors may be a member of the graduate faculty in another field of study or he/she may be external to the University of Connecticut, working in academia, government, or industry.
4. All full-time graduate students must enroll in the Graduate Seminar (MSE 6401) every semester.

Requirement (1) may be modified if the student has passed equivalent courses in a different department at the University of Connecticut or at a different university in a similar graduate program. Such decisions shall be made on a case-by-case basis by the student's Advisory Committee.
The majority of the student's research project must be performed on campus under the supervision of the Principal Advisor. Portions of the research may be performed at outside facilities as deemed necessary. A written thesis based on this research must be submitted to the student's Advisory Committee at least two weeks before the defense date. The thesis defense shall be open to the public. Following the public presentation, the student shall be further examined by the Advisory Committee and any other faculty members present. The Advisory Committee shall then meet privately and make their decision to approve or disapprove the thesis. Approval must be unanimous. The thesis research must be considered by the committee to be publishable in a refereed journal in the field. Although publication is not required for graduation, you are very strongly advised to submit publications before completing and defending your thesis.

Plan B: The Non-Thesis Option
The main requirements of this plan are as follows:

1. The student must successfully complete at least 10 graduate courses (30 credits), maintaining a GPA of 3.0 or above. At least 6 of these courses (18 credits) must be MSE courses.
2. The student must file a Plan of Study with the Graduate School. This plan must be approved by the student's Advisory Committee and the Executive Committee of the Graduate Faculty Council.
3. The student must conduct a research project and pass an oral Comprehensive Examination based on this project. Each student shall select his/her own Advisory Committee. This committee must consist of one Principal Advisor and two Associate Advisors. The Principal Advisor and one Associate Advisor must be members of the graduate faculty in the Materials Science and Engineering field. One of the Associate Advisors may be a member of the graduate faculty in another field of study or he/she may be external to the University of Connecticut, working in academia, government, or industry.
4. All full-time graduate students must enroll in the Graduate Seminar (MSE 6401) every semester.

Requirement (1) may be modified if the student has passed equivalent courses in a different department at the University of Connecticut or at a different university in a similar graduate program. Such decisions shall be dealt with on a case-by-case basis by the student's Advisory Committee.
The required research project shall be an industrial or laboratory project conducted in close collaboration with the Principal Advisor. The student must present a 15-20 minute oral exposition of the research results to the Advisory Committee, after which the Committee

shall conduct the Comprehensive Examination. The presentation shall not be open to the public. The research need not be publishable in a refereed journal. The Comprehensive Examination shall be a one-hour oral examination conducted by the student's Advisory Committee. This examination shall focus primarily on the student's research project, but it may also include questions pertaining to the student's course work. The student must pass this examination by unanimous approval of the Advisory Committee.
Typical duration of a Plan B Master's degree is 2 to 4 years beyond the Baccalaureate degree. There is no financial support available for Plan B Master's students.

DOCTORAL DEGREE

To earn a Doctoral degree in the Materials Science & Engineering (MSE) Department, students must follow the general rules and regulations for the Doctoral degree as established by the Graduate School in the latest Graduate Catalog. There are additional requirements for a Ph.D. degree in MSE that are detailed under Sec. I – Requirements.

The typical duration of a Doctoral degree is 5 years beyond the Baccalaureate degree or 3 years beyond the Master's degree. Most graduate students enrolled in the Ph.D. program are supported by some form of an assistantship (graduate, research, or teaching). Research assistantships are funded by grants from the federal government, the State government, or private industry. Graduate and teaching assistantships are funded by the University. All forms of assistantships carry a stipend, a full tuition waiver, and an opportunity to purchase highly subsidized health insurance. Note that various sources of financial assistance (TAships, fellowships, industrial support, etc.) often include certain requirements (office hours, special courses, directed research, etc.). These requirements should be fulfilled separate from your mandatory progress in courses and research.

I. Requirements

The key requirements of the Graduate School are that students maintain an overall GPA of 3.0, submit a Plan of Study (PoS) to the Graduate School, pass a General Examination, and successfully defend their thesis. The details of all requirements for a Ph.D. are outlined in the latest Graduate Catalog, found at http://catalog.grad.uconn.edu. An informational departmental checklist can be found at http://www.mse.engr.uconn.edu/wp-content/uploads/2017/05/PhD_MSEchecklist2017_5_8.pdf.

In addition to these Graduate School requirements, the MSE program requires that:

1. The student must successfully complete 4 Core Courses (MSE 5301, 5309, 5322, and 5334) and maintain a minimum GPA of 3.0 in these courses.
2. The student must pass a written Qualifying Examination.
3. The student must pass a General Examination, which incorporates the outcome of the Qualifying Exam but also consists of a written Ph.D. thesis proposal and an oral presentation to the Advisory Committee. Each student shall select his/her own Advisory Committee. This Proposal must be approved by the student's Advisory Committee and the Executive Committee of the Graduate Faculty Council.
4. The student must enroll in the Graduate Seminar MSE 6401 every semester they are a full-time UConn student.
5. The student must serve as a Teaching Assistant for 2 semesters.
6. The student must demonstrate at least 1 published or accepted manuscript in a peer review journal.
7. The student must ultimately prepare and orally defend a research thesis.

II. The Qualifying Examination

All students seeking candidacy for the Ph.D. degree must sit for a written qualifying examination. The examination is given once a year after the first semester of full-time graduate study in the doctoral program and measures the student's level of preparedness to pursue advanced graduate coursework and research in MSE. Students are expected to demonstrate a high level of aptitude in the physical sciences and mathematics and to be knowledgeable in the application of these topics to the structure, properties, and processing of condensed states of matter. To be eligible for the examination, the student must be admitted for study in the Doctoral program and must file an application form with the MSE office staff at least 3 weeks prior to the exam. Furthermore, students must have completed three graduate courses, at least two being MSE core classes, in their first semester. They must maintain a cumulative GPA of at least 3.0. The qualifying examination is administered by a panel of five members of the MSE graduate faculty designated by the Chair of the Graduate Program. The panel reviews the student's performance in the examination and in the three graduate classes and renders a decision on candidacy for the Ph.D. degree. In some cases, students who are unsuccessful may be offered the option to continue

graduate study in the MSE program towards an M.S. degree. Petitions to retake the examination are rarely granted.

III. The Plan of Study

The student shall put together a PoS under the guidance of his/her Principal Advisor. All Ph.D. students entering the MSE Ph.D. program must take two MSE core courses and one other graduate-level class in their first semester and maintain a 3.0 GPA. Furthermore, the PoS should include the four designated MSE classes and an additional 12 credits of advanced coursework tailored to the student's specific interests for a minimum 30 credits of class work. Three of the elective courses may be taken outside the MSE program. The student must maintain a minimum GPA of 3.0, both in the core courses and overall. In general, the PoS should include coursework providing coverage of structure, processing, and properties of materials. The PoS shall also include at least 15 credits of Dissertation Research (GRAD 6950) and the total number of credits should not be less than 45, excluding MSE 6401. The core course requirement may be modified if the student has passed equivalent courses in a different department at the University of Connecticut or at a different university in a similar graduate program. Such decisions shall be dealt with on a case-by-case basis by the Chair of the Graduate Program.

IV. The General Examination: Dissertation Proposal

Preceding the General Examination, a PoS must be submitted to the Graduate School for approval. For the General Examination, the student prepares a written Ph.D. thesis proposal and presents it orally to a faculty committee. This exam is scheduled on an individual basis after coursework is completed. The student is required to submit a written Dissertation Proposal to his/her Advisory Committee.

A typical proposal is 15 pages, including sections covering motivation, background and literature survey, preliminary results, proposed research, reasonable timeline, conclusion, and proper references. A typical presentation lasts 30 minutes covering the most relevant aspects of the proposal. This is followed by up to 90 minutes of discussion and questions with particular emphasis on fundamental materials science concepts related to a student's coursework, project, and plans for completion.

The student shall also present and discuss the Proposal in front of a panel comprising the Advisory Committee and two additional members of the MSE graduate faculty. It is expected that the student will have acquired a comprehensive knowledge of fundamental Materials Science and Engineering principles regardless of the elective courses taken prior to the examination. If this competency is not demonstrated adequately during the oral examination, the Advisory Committee may recommend that additional courses be taken above and beyond those included in the student's PoS.

If the Proposal is not acceptable to the Committee, the Committee shall suggest amendments, whereupon the student shall revise and re-submit the Proposal. The Proposal must receive unanimous approval from the Advisory Committee. The student shall submit the Proposal to the Graduate School for approval by the Executive Committee of the Graduate Faculty Council. The student shall also deliver a copy of the approved Proposal to the Graduate Records Office.

V. The Research Thesis and Defense

The majority of the student's research project shall be performed on campus under the supervision of the Principal Advisor. The residency requirement shall be fulfilled by conducting full-time research and study for a minimum of 2 consecutive semesters on the Storrs campus. Portions of the research may be performed at outside facilities as deemed necessary.

The student shall submit the written thesis to the Examination Committee for review at least two weeks before the Defense date and announce in UConn and MSE calendars. This Committee shall consist of the Advisory Committee (3 persons) plus 2 additional members chosen by the Advisory Committee. The student shall present an oral Thesis Defense, which will be open to the public. Following the public presentation and discussion, the student shall be examined orally by the Examination Committee and the other faculty members present. The thesis research must be publishable in a refereed journal in the field.

Additional Information

Requests for additional information should be directed to the Department of Materials Science and Engineering. Additionally, this address should be used for letters of recommendation, personal letters supporting the application, financial aid forms, and all routine communications regarding graduate admissions:

Department of Materials Science & Engineering
University of Connecticut
97 North Eagleville Road, Unit 3136
Storrs, CT 06269-3136
Phone: 860.486.4620

TUITION & FEES

All graduate students enrolled in this program will be subject to a tuition charge. This is in addition to the other fees charged to Connecticut, New England Regional Students Program, and out-of-state students. As of 2017, Connecticut residents pay $7,250 per semester if registering for nine or more credits. Students who are classified as out-of-state pay $17,906 per semester for nine or more credits. For full-time funded students, this tuition (but not associated fees or housing costs) is usually paid for by grants, graduate assistantships, etc.

There are various fees that apply to all graduate students regardless of assistantships and must be paid by the first day of classes. The Bursar's Office encourages payment as soon as possible, typically after registration. Tuition and Fee rates are subject to change in the future. For a more detailed and up-to-date description of the fees listed, please visit the Graduate School website: http://bursar.uconn.edu/description-of-fees-2/.

As of Fall 2017:

- General University Fee - $708/semester
- Infrastructure Maintenance Fee - $234/semester
- Student Activity Fee - $16/semester
- Graduate Matriculation Fee - $42/semester
- Activity/Transit and Student Union Fees - $60/semester
- Technology Fee - $75/semester
- Total Fees: $1,135/semester

A student who fails to make timely payment of an outstanding balance may be barred from all privileges normally accorded to a student in good standing. These include but are not limited to course registration, class attendance, advisement, dining hall, library, infirmary, and academic transcript privileges. If there is any question concerning a bill, it is the student's responsibility to contact the Office of the University Bursar directly for clarification and resolution.

Additionally, students who are paid graduate assistantships have the option of deducting their fees from their bi-weekly paychecks. This can be done through the PeopleSoft system.

FINANCIAL AID

Two major types of financial aid are available to graduate students: (1) financial aid based on academic merit, and (2) financial aid based on need.

Awards based on academic merit include: Graduate Assistantships (for teaching or research), University Predoctoral Fellowships, Dissertation Fellowships, and Summer Fellowships. Academic departments, not the Graduate School, make decisions on the award of graduate assistantships and fellowships.

Typically, all full-time Ph.D. graduate students in the Department are supported by some form of an assistantship (graduate, research, or teaching). Research assistantships are funded by grants from the Federal government, the State government, or private industry. Graduate and teaching assistantships are funded by the University. All forms of assistantships carry with them a stipend, a tuition payment, and an opportunity to purchase highly subsidized health insurance. Again, you must serve as a teaching assistant for at least two semesters and have full-time student status (which requires at least 6 credits) while holding the appointment. To be appointed, you must hold Regular (not Provisional) academic status and maintain a cumulative grade point average of at least 3.0 (B).

Need-based Financial Aid

United States citizens and permanent residents of the United States (but not International Students) may apply for need-based financial aid, which includes Federal Stafford Loans (FSL), Federal Work Study, and University of Connecticut Tuition Remission Grant. *To apply for need-based aid, an additional form not included in the online or paper application must be completed.

The required application for need-based aid is the Free Application for Federal Student Aid (FAFSA) or Renewal FAFSA. Application materials should be available on/after December 15. The FAFSA may also be obtained from any high school guidance office or college/university financial aid office. You can also file an electronic FAFSA on the web at: www.fafsa.ed.gov. For more information on FAFSA, visit the University of Connecticut financial aid website at: www.financialaid.uconn.edu.

Need-based financial aid deadlines are March 1 for continuing UConn graduate students and May 1 for entering UConn graduate students. The FAFSA must be received and logged in at the Federal Processor on or

before the published deadline. On-time status will not be determined by postmark dates or postage receipts. Priority for the awarding of Federal Work Study as well as University of Connecticut Tuition Remission funds will be reserved for applicants who comply with the above deadlines. Applications received after the deadline will be considered for Federal Stafford Loans only.

Private Loans

•www.gradloans.com - One of the best Financial Aid sites available, containing deadline calendars, guides for choosing a loan, and specific information for financing your graduate education.

•www.collegeanswer.com - Online Sallie Mae loan search. Includes loans for Graduate work.

LISTING OF UCONN GRADUATE STUDENT FELLOWSHIPS & FINANCIAL AID OPPORTUNITIES

Outstanding Scholars Program

The Graduate School and participating academic departments will nominate outstanding new doctoral students for this fellowship. Each award includes a 50% graduate assistantship and a $2,000 summer stipend funded by the Graduate School. The MSE Department funds the other 50% to make a 100% full graduate assistantship. Applicants must have a GPA above 3.6, GRE scores exceeding 1400, a personal statement, and letters of recommendation.

Multicultural Scholars Program

This award is for the promotion of diversity in graduate education. Students are nominated by the graduate program to which they are applying. Eligibility for support is based on students' academic qualifications, U.S. citizen or permanent resident status, and the demonstrated need for increased cultural diversity within the field of study.

Tuition Assistance Program for Out-of-State Master's Degree Students

This award provides tuition assistance to selected students in terminal Master's degree tracks who are classified as out-of-state for tuition purposes. It allows these students to pay in-state tuition for up to four semesters. Students are nominated by faculty members and he/she must be a U.S. citizen to qualify.

Graduate Student Senate Short-term Loan Fund

The fund is administered by the Graduate Student Senate (GSS), and is funded by the graduate student activities fees. It provides interest-free loans up to $500 for emergencies. Visit the GSS website at www.gss.uconn.edu for further information.

Semi – Annual Doctoral Dissertation Fellowships Program

This program is designed to assist advanced Ph.D. students in completing their dissertations. Minimum eligibility requirements include having passed the doctoral general exam, having a fully approved dissertation proposal on file with the Graduate School, and earning less than the annual income limit. The maximum amount eligible students may apply for is $2,000. Applications can be found on the Graduate School webpage.

Doctoral Dissertation Extraordinary Expense Award

Ph.D**.** students who have passed the general exam and whose dissertation proposal has been fully and officially approved may apply for up to $500 for non-routine expenses directly related to data collection for the dissertation. Eligible students may apply at any time. Applications can be found on the Graduate School webpage.

Graduate Assistantships/Predoctoral Fellowships

Departments have a limited number of graduate assistantships and fellowships to disperse each year. Most awards are based upon merit and financial need. There is a credit requirement the student must meet each semester based upon whether the assistantship is a full-time or half-time award. There are also different payment rates associated with each stipend level. Included with both full- and half-time assistantships are tuition waivers and the opportunity to purchase highly subsidized health insurance. The student must still pay all associated University fees. More detail is provided in the Catalog or on our website. The student should contact his/her home department for further information.

CORE COURSES

		Credits
MSE 5301	Thermodynamics of Materials	3
MSE 5309	Transport Phenomena in Materials Science and Engineering	3
MSE 5322	Materials Characterization	3
MSE 5334	Structure and Defects in Materials	3

ELECTIVES

		Credits
MSE 6401	MSE Graduate Seminars in Materials Science and Engineering (mandatory for all full time graduate students)	1
MSE 5001	Principles of Materials Engineering	3
MSE 5095	Independent Study	1 - 3
MSE 5305	Phase Transformations in Solids	3
MSE 5310	Modeling Materials	3
MSE 5311	Mechanical Properties of Materials	3
MSE 5317	Electronic and Magnetic Properties of Materials	3
MSE 5320	Investigation of Special Topics	3
MSE 5323	Transmission Electron Microscopy	3
MSE 5330	Classical Atomic-level Simulations in Materials Science and Engineering	3
MSE 5335	High Temperature Materials	3
MSE 5336	Material Selection in Mechanical Design	3
MSE 5343	Corrosion	3
MSE 5364	Advanced Composites	3
MSE 5366	Alloy Casting Processes	3
MSE 5370	Ceramics	3
MSE 5700	Biomaterials Tissue Engineering	3

Other electives on request with advisor permission.

RESEARCH

		Credits
GRAD 5950	Master's Thesis Research	1 - 9
GRAD 5960	Full-Time Master's Research	3
GRAD 5930	Full-Time Directed Studies (Master's Level)	3
GRAD 5998	Special Readings (Master's)	0
GRAD 5999	Thesis Preparation	0
GRAD 6950	Doctoral Dissertation Research	1 - 9
GRAD 6960	Full-Time Doctoral Research	3
GRAD 6930	Full-Time Directed Studies (Doctoral Level)	3
GRAD 6998	Special Readings (Doctoral)	0
GRAD 6999	Dissertation Preparation	0

MSE 5001. Principles of Materials Engineering
Accelerated Introduction to Materials Science and Engineering Concepts, including: structures and defects; phase diagrams; mechanical properties; electronic properties; magnetic properties; optical properties; thermal properties; functional materials; metals and alloys; ceramics; polymers; and composites.
3 credits. Lecture.

MSE 5095. Independent Study
Independent Study. Maximum of 3 credits allowed with your advisor.
1-3 credits.

MSE 5330. Classical Atomic-level Simulations in Materials Science and Engineering
Introduction to several classical atomic-level simulation techniques (molecular dynamics, Monte Carlo methods) with an emphasis on learning the art of designing simulations and analyzing data generated. The capabilities of the methods to investigate properties and response of materials and the current limitations of materials at the atomic scales will be covered.
3 credits, Lecture.

MSE 5301. Thermodynamics of Materials
Classical thermodynamics with emphasis on solutions and phase equilibria. Applications to unary and multicomponent, reacting and nonreacting, and homogeneous and heterogeneous systems, including development of phase diagrams.
3 credits, Lecture.

MSE 5305. Phase Transformations in Solids
Thermodynamics, kinetics, and crystallography of phase transformations. Nucleation and growth kinetics. Order-disorder, ferroelectric, and ferromagnetic transformations.
3 credits, Lecture.

MSE 5309. Transport Phenomena in Materials Science and Engineering
Mechanisms and quantitative treatment of mass, energy, and momentum transfer will be discussed in the context of materials science and engineering applications. Increasingly complex and open-ended applications will be used to illustrate principles of fluid flow; heat conduction, radiation, and diffusion.
3 credits, Lecture.

MSE 5310. Modeling Materials
This course is intended to provide an overview of the theory and practices underlying modern electronic structure materials computations, primarily density functional theory (DFT). Students involved primarily/partially in materials computations, as well as those focused on experimental materials research wishing to learn about DFT techniques will benefit from this course.
3 credits, Lecture.

MSE 5311. Mechanical Properties of Materials
Mechanics of deformation and fracture, dislocation theory, strength of ductile and brittle materials, toughness, strengthening mechanisms, toughening mechanisms, creep mechanisms, fatigue crack initiation and propagation, reliability and lifetime prediction.
3 credits, Lecture.

MSE 5317. Electronic and Magnetic Properties of Materials
Crystal structures and interatomic forces, lattice vibrations, thermal, acoustic, and optical properties. Semiconductors, dielectric properties, magnetism, and magnetic properties, superconductivity. Device applications.
3 credits, Lecture.

MSE 5320. Investigation of Special Topics
Special courses or individual readings.
3 credits, Lecture.

MSE 5322. Materials Characterization
A review of the principal experimental methods used to reveal the microstructure and chemistry of materials. Diffraction techniques: x-ray, electron, neutron and proton scattering. Photon probes: photon microscopies, x-ray topography and XPS. Electron probes: SEM, TEM, EDX, EELS, AES. Atom and ion probes: RBS, SIMS, FIM, PIXE. Scanned probe microscopies.
3 credits, Lecture.

MSE 5323. Transmission Electron Microscopy
Electron beam-specimen interactions. Basics of electron microscopes. Diffraction: theory, types of patterns and interpretation. Imaging: diffraction contrast, phase contrast and other techniques. Spectrometry: x-ray microanalysis and electron energy-loss spectrometry.
3 credits, Lecture. Prerequisite: MSE 5322 or consent of instructor.

MSE 5334. Structure and Defects in Materials
Structure of amorphous and vitreous materials. Crystallography: translation symmetry and lattices, point and space groups, use of the International Tables for Crystallography, examples of simple crystal structures. Defects in materials: point defects, line defects, planar defects, homophase and heterophase interfaces. Distributions of structure and defects: an introduction to microstructure.
3 credits, Lecture.

MSE 5335. High Temperature Materials
Strength-determining factors in advanced alloys, ceramics, and composites. Role of material chemistry and microstructure. High temperature creep and crack growth. Oxidation. Thermomechanical behavior.
3 credits, Lecture.

MSE 5336. Material Selection in Mechanical Design
The course consists of a study of materials and how they are chose for various mechanical designs. A wide range of materials will be discussed (metal, ceramic, polymer, etc.) and their key properties (modulus, strength, density, etc.) in design will be reviewed. Guidelines for material selection will be shown. As part of the course, design trades will also be discussed.
3 credits, Lecture. Prerequisite: MSE 2101 or consent of instructor.

MSE 5343. Corrosion
Mechanisms, characteristics, and types of corrosion. Test methods and evaluation of corrosion resistance. Suitability of metals, ceramics, and organic materials in corrosive environments. Oxidation and other high temperature gas-metal reactions.
3 credits, Lecture.

MSE 5364. Advanced Composites
Mechanical properties, analysis and modeling of composite materials. The properties treated include stiffness, strength, fracture toughness, fatigue strength and creep resistance as they relate to fiber, whisker, particulate, and laminated composites.
3 credits, Lecture.

MSE 5366. Alloy Casting Processes
Principles and practices of alloy solidification and casting processes are discussed and applied in the context of sand, investment, permanent mold and die casting; continuous and direct chill casting; electroslag and vacuum arc remelting; crystal growth; rapid solidification; and laser coating.
3 credits, Lecture.

MSE 5370. Ceramics
Prerequisites: a knowledge of Materials Science at the undergraduate level is essential, or MSE 5001
A graduate-level treatment of the science and engineering of Ceramic Materials. Concepts to be studied include the structure of both crystalline and non-crystalline material, and defects (including point defects, dislocations and interfaces) in these materials. A broad range of special (for ceramics) methods for the preparation, processing and characterization of these materials will run throughout the course. An important component of the course is consideration of how the crystal structure determines or influences mechanical, electronic, magnetic, and thermal properties. Special topics may include functional ceramics, 2D ceramics, and connections between ceramics, economics and global affairs.
3 credits, Lecture.

MSE 5700. Biomaterials and Tissue Engineering
A broad introduction to the field of biomaterials and tissue engineering. Presents basic principles of biological, medical, and material science as applied to implantable medical devices, drug delivery systems and artificial organs. Not open to students who have passed BME 4710, Also offered as BME 5700.
3 credits, Lecture.

MSE 6401. Graduate Seminars in Materials Science and Engineering
Presentations by invited guest speakers on topics of current interest in various areas of Metallurgy and Materials Engineering.
1 credit, Seminar.

GRAD 5930. Full-Time Directed Studies (Master's Level)
Open only to Master's Plan A students. Graduate School consent required. This course denotes that the student is participating in a full-time internship, field work experience, or other course of off-campus study required as part of the student's Master's Plan A program. No other courses may be taken concurrently.
3 credits, Practicum.

GRAD 5950. Master's Thesis Research
This course is associated with the research efforts of students pursuing a Plan A Master's degree, and may be used to meet the nine credit Master's research requirement.
1-9 credits, Thesis Research.

GRAD 5960. Full-Time Master's Research
This course is to be used by those students who have completed all courses on the plan of study and who are performing Master's level research on a full-time basis. It may contribute to meeting the Master's research credit requirement. No other courses may be taken concurrently. In the summer, this is a 12-week (Summer 4) course. Since this course denotes a full-time commitment, students may not hold graduate assistantships while taking this course.
3 credits, Thesis Research.
Graduate School consent required.

GRAD 5998. Special Readings (Master's)
To be used by Master's students who are not enrolled in a thesis (Plan A) track.This is a non-credit course for which Master's degree students must register in cases where their regular for-credit coursework has been interrupted and they are not otherwise registered. International students should consult with the Graduate School prior to registering for this course.
0 credits, Special Readings.

GRAD 5999. Thesis Preparation
Open only to graduate students enrolled in Plan A Master's degree programs. This is a non-credit course used to maintain registered status after students have completed their coursework and are not registered for any other credit-bearing course. International students should consult with the Graduate School prior to registering for this course.
0 credits, Thesis Research.

GRAD 6930. Full-Time Directed Studies (Doctoral Studies)
Open only to doctoral students. Graduate School consent required. This course denotes that the student is participating in a full-time internship, field work experience, or other course of off-campus study required as part of the student's doctoral program. No other courses may be taken concurrently.
3 credits, Practicum.

GRAD 6950. Doctoral Dissertation Research
Open only to doctoral students. This course is associated with the research efforts of students pursuing a doctoral degree, and may be used to meet the fifteencredit doctoral research requirement.
1-9 credits, Dissertation Research.

GRAD 6960. Full-Time Doctoral Research
Open only to doctoral students. Graduate School consent required. This course is to be used by those students who have completed all courses on the plan of study and who are performing doctoral level research on a full-time basis. It may contribute to meeting the fifteen credit doctoral research requirement. No other courses may be taken concurrently. In the summer, this is a 12-week (Summer 4) course. Since this course denotes a full-time commitment, students may not hold graduate assistantships while taking this course.
3 credits, Dissertation Research.

GRAD 6998. Special Readings (Doctoral)
Open only to doctoral students. This is a non-credit course for which doctoral students must register in cases where their regular for-credit coursework has been interrupted and they are not otherwise registered. International students should consult with the Graduate School prior to registering for this course.
0 credits, Special Readings.

GRAD 6999. Dissertation Preparation
Open only to doctoral students. This is a non-credit course used to maintain registered status after students have completed their coursework and are not registered for any other credit-bearing course. International students should consult with the Graduate School prior to registering for this course.
0 credits, Dissertation Research.

Senior Level Courses which can be approved by student's advisor:

MSE 4001	***Electrical & Magnetic Properties***
MSE/BME 4701	***Advanced Biomaterials***
MSE 4800	***Materials for Advanced Fossil Energy Systems***
MSE 4801	***Materials for Alternative, Renewable Energy***
MSE 4005	***Process Materials Liquid & Vapor State***
MSE 4240	***Materials for Nanotechnology***

Students may take a 3000-level course for credit but it will not count towards the plan of study because it is not a required course for graduation.

REGISTRATION

Electronic Notification and Enrollment

Enrollment and all related communication are done electronically. If a student chooses not to use the UConn email system for primary contact purposes, it is crucial that he/she set up automatic forwarding of UConn email to an address that is checked regularly. This can be done by going to http://forward.uconn.edu and providing the requested information.

Registration is through the PeopleSoft Student Administration System, accessed at http://student.studentadmin.uconn.edu.

Change of Passwords or Forgotten Password

With the new version of the Student Administration System, passwords can be reset automatically. If a student has forgotten his/her password, he/she can simply click the "Forgot Your Password?" link on the PeopleSoft login page. After entering his/her seven-digit login ID, the system will reset the password and send it to his/her official university e-mail address. If there is any difficulty with this process, contact the UITS Help Desk at 860-486-HELP (4357), not the Graduate School.

Consequences of Failure to Register & Registration Deadlines

Unfortunately, if a student does not register for courses and pay all applicable fees OR apply for an issuance of limited deferment prior to the 10th day of classes, he/she will be discontinued by the system. To be reinstated, he/she will have to pay a $65 reinstatement fee as well as complete the "Request for Reinstatement Form" and submit to The Graduate School. If the student has a graduate assistantship, it will be suspended until the student has registered. Any loans or other need-based aid he/she has been awarded will also be put in jeopardy.

Financial Aid Connection

If a student receives any form of financial aid (including a graduate assistantship or need-based aid from the Student Financial Aid Office), he/she should register for as many of the necessary classes as possible, as early as possible. In particular, graduate assistants MUST be registered for at least 6 credits or they will have their paychecks held. Those receiving financial aid (other than a GA) must be registered for at least 9 credits to be considered a full-time student, or at least 5 credits to be considered half-time. If the Financial Aid Office finds that a student has not registered for the appropriate course load, they will not be able to process his/her aid disbursement.

Adding/Dropping Courses

All course selections and changes (add/drop) must be made with the prior consent of the major advisor unless otherwise specified. Adding or dropping a course without the consent of the advisor may result in loss of financial support.

Students have until the tenth day of the semester to sign up for courses. Courses added after the tenth day must be submitted to the Graduate School.

Before terminating class attendance, students should make sure the course has been dropped officially. No grade is recorded for courses officially dropped, but a mark of W is recorded for withdrawal from a course after the tenth day of the semester (or after the first week of a summer-session course).

During the first nine weeks of the semester, a course may be dropped directly by the Graduate School by filing a schedule revision request card with the Graduate School. After nine weeks, students are generally not allowed to drop a course. If a student must drop a course because of illness or other compelling reasons, the student must request special permission as early as possible and well before the last day of classes. Permission must be obtained by the Graduate School.

Permission Numbers

Some courses may require a permission number to allow you to add the course to your schedule. The online system will require a permission number when courses are full or when a pre-requisite is required. Giving a permission number will override prerequisites and class enrollment limits. A permission number will NOT override time conflicts, repeating the class a third time, service indicators, or a credit limit. In order to get permission numbers please see the MSE office staff in IMS room 111.

Dropping all Courses: Withdrawal from the Program

The general policies and procedures regarding dropping one course also apply to dropping all courses, whether the student wishes to remain active in the graduate degree program or to withdraw permanently from it. Permission from the Graduate School is needed for the student either to remain active in the program or leave in good standing. If a refund is due to a student, the request card must be signed by the appropriate Graduate School officer regardless of the week of the semester.

The Materials Science and Engineering Department requires written notification from any graduate student who intends to permanently withdraw from the graduate program. Students who are supported with a Fellowship, Teaching, or Research Assistantship must give written notification to the Director of the Graduate Program and their faculty advisor at least 6 months prior to departure. Students who are not supported financially must provide written notification at least 3 months prior to departure.

Continuing Registration

See Graduate Catalog. Should a student need to take some time off, they can register for a non-credit course until their degree is complete by paying graduate matriculation fees. Notification of leave should be given to his/her faculty advisor at least three months prior to the semester of the leave. Master's students will need to register for zero credit course GRAD 5998. Ph.D. students will register for zero credit course GRAD 6998. International students may take time off but may only register for zero credit courses for up to one academic year. Failure to enroll in this course means students may need to reapply for the program.

For further information log on to:
http://catalog.grad.uconn.edu

ACADEMIC POLICIES

Scholastic Standards

Students are required to maintain at least a B (3.0) average in their program. Whenever a student's cumulative average falls below 3.0, the program is reviewed by the student's advisory committee to determine whether or not the student shall be permitted to continue graduate study. For all Incompletes, it is the student's responsibility to reach and maintain an understanding with the instructor concerning the timely completion of the work. If there are more than three Incompletes, the student may be required to complete those still viable before being allowed to register for additional course work.

Academic Dismissal

A graduate student's progress in a degree program is monitored by the student's advisory committee. If at any time a student's academic performance, graduate degree program progress, or professional development or suitability is judged by his or her advisory committee to be unsatisfactory, and if the advisory committee determines that dismissal on any of these grounds is warranted, the advisory committee must submit to the Dean of the Graduate School a written recommendation that the student be dismissed.

Students may be subject to dismissal if he or she (1) fails to maintain the minimum cumulative grade point average required by the Graduate School (3.0); (2) receives a grade of D+, D, D-, F or U in any course; (3) fails the doctoral general examination; (4) fails to produce an acceptable doctoral dissertation proposal; (5) performs unsatisfactorily in any aspect of the research or writing for a Master's thesis or doctoral dissertation; (6) fails the final examination for the Master's or doctoral degree; and (7) fails to satisfy any other academic requirement of the student's graduate degree program.

Transfer of Credit

Transfer of credit for course work completed at other institutions is approved only after the student has demonstrated the ability to do acceptable graduate work at the University of Connecticut. The maximum number of non-degree credits accepted from accredited institutions is six, provided it is of at least B (not B-) quality and contributes to the objectives of the proposed

doctoral program. If you were a UConn undergraduate student, you can only transfer undergraduate course credit if it was NOT used towards your undergraduate degree requirements. Similarly, graduate course credit can only be considered for transfer if it was not already applied to a graduate degree.

Department Seminars

The Department of Materials Science & Engineering organizes a number of seminars each year, and all full-time M.S. and Ph.D. graduate students are required to attend. All full-time graduate students (M.S. & Ph.D.) must sign up for the course every semester (MSE 6401). 100% attendance of MSE program seminars is required to earn the full MSE 6401 credit. If, for any reason, a student cannot attend one or more talks, he/she must fill out a Missed Seminar Make-up Form. Students are only allowed to miss 3 seminars and submit 3 seminar make-up forms. Acceptable reasons to miss a seminar include: (1) attendance at a scientific conference; (2) attendance at another UConn science or engineering department's seminar.

Graduation Procedures

Formal application for a degree to be conferred must be filed online by the degree candidate using the PeopleSoft system. If filing is not timely, conferral will be delayed to the next conferral period even if all other degree requirements may have been completed.

New Master's Plan A Thesis Submission Procedure

Students must go to Digitalcommons.uconn.edu, set up a free account, and submit papers in PDF format. Additional instructions can be found on the Digital Commons website.

Non-Degree Program

U.S. students who do not have the requirements or simply do not wish to be part of the regular graduate program can take courses under non-degree status. Applicants who do seek enrollment in the graduate program can register under this status while their application is being processed. They should, however, note that registration under this status will have no effect on the approval or denial of their application. With the approval of the student's advisory committee and the Graduate School, a maximum of two non-degree courses with grades of B or higher can be transferred to the graduate degree program. Non-degree students may register for courses in the Department of Materials Science and Engineering only with the approval of the Department Head.

Provisional Admission

Occasionally, students who hold the baccalaureate but do not fully qualify for admission under regular status are able to give evidence of their academic ability that is sufficient to warrant their provisional admission to a Master's degree program. If a Provisional student's initial twelve credits of completed course work meet the minimum academic requirement of the Graduate School, he/she is accorded Regular status. Otherwise, he/she is subject to dismissal. In situations where special consideration is warranted, and only upon the specific request of the major advisor, the Dean may approve changing a student to regular status if at least nine credits of advanced course work have been completed with superior grades. Regular, not Provisional, status is required for degree conferral. Students must have at least a 2.6 GPA to be considered for Provisional Admission.

DEGREE CHANGES

From M.S. to Ph.D.

If you are currently enrolled in our M.S. program and are looking to be a Ph.D. student, you must re-apply with the Graduate School. However, if you are looking to only change the degree earned and not the program, you can call the Graduate School before applying and they will waive the $75 application fee. You will not need to re-submit your official transcripts, letters of recommendation, C.V., or GRE scores, since these have all been kept on file from your previous application. You only need to re-submit an application. If you are an international student, a new I-20 reflecting the degree change will be generated when your application is complete.

Most of our M.S. students are not funded, so if you are planning on transferring to the Ph.D. program and would like to begin receiving funding, you will need to speak with your intended advisor. Students will not be awarded funding automatically and faculty members must contact the MSE office staff in admissions if they intend to begin funding you as a graduate student.

From Ph.D. to M.S.

If a student is discontinuing the Ph.D. program and opts to receive their Master's degree instead, the Graduate School will require an email from the student's major advisor requesting the status change to Terminal Master's. For international students, the Graduate School will notify the international expert regarding the status change.

Remember our M. S. students are typically not funded. Therefore, if you choose to change your degree status, your advisor may opt to discontinue your funding. This should be discussed further with your advisor before making a decision.

FACULTY

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Cato Laurencin, University Professor; Albert and Wilda Van Dusen Distinguished Professor of Orthopedic Surgery
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ADDITIONAL FACULTY

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UCHC Farmington
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Research Interests: Biofuels Process Design, Biodegradable Polymers, Pervaporation Membranes, and Biomass Extraction.

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Purchasing and Shipping (IMS Accounts)

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Assignment of Office & Desks, Building Issues, Lab Access, Lab Key, IMS Safety Officer, Security Issues, General Purchasing Questions

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RESEARCH AND LAB RESOURCES

Extensive additional resources are available to MSE researchers in the Institute of Materials Science, Technology Park, and several targeted centers in Storrs and the UConn Health Center. This includes administrative support as well as technical expertise, facilities and training.

More information can be found at the following weblinks:

http://www.ims.uconn.edu/

http://techpark.uconn.edu/

https://health.uconn.edu/

OTHER INFORMATION

Important Semester Dates
Academic calendars can be found on the Registrar's website at www.registrar.uconn.edu/calendar.htm. Please check registration deadlines as well as important holiday and exam dates.

Faculty Advisor
While some students admitted to our program may have permanent pre-assigned advisors, most students will be admitted to our program with the program directors as their default assigned advisor. During the first few weeks of your arrival to IMS you will have the opportunity to meet and to learn about our faculty members and their current research projects. You will have the chance to 'choose' an advisor based on mutual interest and the availability of funds. To change your advisor you must go to the Graduate School's website and print and submit the 'Change of Advisor' form.

Pay
Students admitted with a Graduate Assistantship may still have tuition costs listed on their fee bill. In order to waive tuition costs you must first complete the necessary documents such as your Employment forms (1-9 form) and all Tax forms (CT and Federal W-4 forms). Employment I-9 forms will need to be filled out with the MSE office staff located in IMS room 111. You will need 2 forms of identification such as a birth certificate, and license or passport when completing the I-9 form. As for the W-2 tax forms, if you are an international student, you must contact Ellen Lowe (ellen.lowe@uconn.edu) and make an appointment to fill out the tax forms (CT and federal W-4). This is also done at international orientation. If you are domestic student, you can see the MSE office staff in IMS room 111 to complete these forms. Keep in mind that Fees and Housing costs are NOT covered by assistantships - please refer to the Fees & Tuition section of the handbook for further information.

Direct Deposit
As a GA, you will receive payment in the form of bi-weekly checks. Once you have set up a bank account, it is best to sign up for direct deposit to minimize chances of lost checks. Students (both International and Domestic) can sign up for bank accounts at any time. Please submit Direct Deposit forms to the MSE office staff in IMS room 111. Forms are typically handed to students during the MSE Orientation.

International Orientation
It is mandatory that all international students and transfer international students attend the International Orientation. International Orientation always takes place the week before the start of classes. Please visit their website at isss.uconn.edu for further information. Note that it is the responsibility of the student to cover his/her personal orientation expenses.

International Teaching Assistant (ITA) and TA Orientation
All students admitted to the Ph.D. program must complete at least two semesters as a Teaching Assistant. Students are not asked to TA during their first semester with the MSE Department. The MSE Department will pay the ITA/TA teaching fees exam the first time, but any exam that needs to be re-taken is at the expense of the student.

Orientations are offered for both the fall and spring terms. We recommend that all admitted students wait until the beginning of their second semester to register for the ITA/TA orientation. Students should take the TA exam as soon as possible to maximize re-take opportunities (if necessary).

Materials Science & Engineering Orientation
The MSE Department hosts its own orientation in addition to the International Orientation. The MSE orientation will give students the opportunity to meet current students and staff, tour our facilities, and take the safety exam for building and lab access. The date is assigned based around the date of the International Orientation so that they do not overlap. The admissions coordinator will provide students with more information as the date approaches.

Social Security Number (International Students)
International students have the opportunity during the International Orientation scheduled weekly events to

sign up for a social security number. It will still take a few weeks to receive the official Social Security number and Card. Until then, students use their temporary Social Security number (998-**-****) when filling out payroll paperwork. As of recent, the international office also gives you a second temporary Social Security Number which is different than your 998 number please be aware of this when filling out payroll paperwork with the MSE office staff.

Medical Benefits

All students who are admitted as Graduate Students to the University of Connecticut have the option of purchasing the University of Connecticut's Health Insurance (as shown on the fee bill). If the student already has health insurance or is a GA (see below), the insurance fee can be waived by logging in to the Student Administration (PeopleSoft) system and navigating to > SA Self Service > Learner Services > Finance > UC Health Insurance Waiver.

If a student is funded as a GA, the University provides an opportunity to purchase highly subsidized health insurance under the Graduate Assistant plans. Information about the medical and dental insurance plans is available at the following website: http://www.hr.uconn.edu/ct-partnership-health-benefits.

NetID

A student's personal NetID is assigned by the University Information Technology Services. The NetID is necessary for signing up for housing, HuskyCT, and University email. NetIDs are emailed to students 14 days after they confirm their decision to join UConn. If this has not yet been received via UConn email address, contact the UITS directly at 860.486.4357, helpcenter@uconn.edu, or https://netid.uconn.edu.

Housing

On-campus graduate housing is no longer available. Helpful housing information can be found at the following links.

- UConn sponsored off campus student housing: http://www.offcampushousing.uconn.edu/
- Off campus student services: http://www.offcampus.uconn.edu/
- Off campus renter's directory for Storrs, CT: http://www.therentersdirectory.com/storrs.html
- Colonial Townhouse Apartments: http://www.forrent.com/apartment-community-profile/1000069088.php

We also encourage you to contact one another for house-sharing, etc.

Student ID Card

All University of Connecticut students are issued a student ID card from the One Card Office, which is located on the second floor of the Wilbur Cross building. Students do not have to pay for this card. However, if it is lost or broken, there is a replacement fee. Student IDs are used to enter the gym, dining halls, and to grant eligibility to pay student prices for University events.

Parking

Parking Services offers parking passes to all students. For rates, visit their website at http://park.uconn.edu/. Be sure to pay careful attention to which parking areas are designated for your specific type of pass, because UConn police ticket regularly.

Traveling

Many students ask how to get around the area. Students who come here without a license can either go through the process of procuring a license and a car, or rely on friends and classmates for transportation.

Free shuttles provide transportation around the Storrs campus and to surrounding apartment complexes. There is also a WRTD shuttle which brings students from the Storrs campus to and from Willimantic, CT. This shuttle will help if you want to go to the local Eastbrook Mall, buy groceries, or go out to eat with friends.

Bus services are available for travel to larger cities such as NYC and Boston. Megabus and Peter Pan will pick you up on campus and take you to and from a major city in the area at minimal cost. In addition, the Storrs campus airport shuttle provides transporation to and from Bradley International Airport. More about these bus services can be found at transpo.uconn.edu

Meal Plans
All students can sign up for the meal plan that best suits them. For students who live on campus, it may be wise to get a meal plan for times when going off campus to buy groceries is difficult or if he/she would like a meal without having to cook. Visit the Dining Services website at www.dining.uconn.edu to choose a plan that suits your personal needs.

Safety Exam, Keys, Student Offices & Laboratory Usage
All students enrolled in the MSE Department, regardless of funding, need to take the Safety Exam. This is a legal requirement and students need to pass the exam in order to be allowed into the IMS laboratories and use the equipment. Students are then given keys to IMS and assigned a student office in the IMS Gant Plaza. Safety exam materials will be emailed to students as the fall semester approaches. There will be an assigned date and time during your first week at UConn to take this closed-book exam with Joshua Strecker. If you cannot attend during the assigned date, you can make an appointment with Joshua Strecker to arrange another time to take the exam.

Email Account
Each student entering UConn is given a University email account. Additionally, graduate students in the MSE Department will be given an engineering email account. Typically, these accounts receive less spam mail.

Mailbox
All students are assigned a mailbox, located near IMS room 100. Mail is sorted by last name.

Personal mail shipments should NOT be made to IMS but rather your place of residence; IMS mailboxes are for business use only.

Your IMS address is:

University of Connecticut
Institute of Materials Science (IMS)
Unit 3136
97 North Eagleville Road
Storrs, CT 06269 - 3136

Stockroom & Supplies
The IMS stockroom is located next to IMS room 20. Its hours are posted. There students will find safety glasses, gloves, and common lab supplies. If students need safety equipment that cannot be found there, notify Joshua Strecker and it will be ordered. Stockroom supplies are charged to the faculty advisor, so be certain that he/she is aware of the purchases. Other supplies can be obtained from the on-campus Central Stores or from a designated outside vendor. Purchasing procedures and forms must be reviewed with Joshua Strecker before ordering.

Meningitis Clinic
Connecticut state law requires that any college or university student under 29 years of age and residing in university housing be vaccinated against meningitis. Meningitis immunization verification must be listed on the student's Health History Form. Students who have not submitted verification or an exemption form will not be permitted to check into on-campus housing. If a student needs to have his/her meningitis shot done on campus, call Student Health Services at 860.486.4700 to make an appointment.

Ordering Supplies
Ordering forms are located next to the student mailboxes. Completed forms, with your advisors signature should be placed in the drop box outside of IMS accounting labeled 'coding'. The request then goes to IMS purchasing (Nancy Kelleran). Products can be picked up in her office, IMS room 101.

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