PhD in Materials Science and Engineering

The curriculum provides a well-rounded general education and rigorous technical education in order to hone an appreciation for the field of materials science and engineering. This program leverages the strengths of the university and the wide range of materials research and courses already being offered by faculty across a variety of departments on campus. Through the curriculum, problem solving, design, and critical thinking skills are built in both the classroom and through conducting research. The program focuses on materials across a variety of fields including polymers, ceramics, metals, and their composites. Graduates will go on to pursue exciting careers in academia, industry, government, and entrepreneurship.

Degree Requirements

A minimum of 21 hours of graduate classroom coursework will be required for the Ph.D. This includes three core courses including the Introduction to Materials Science & Engineering course as well as one course from a list of Materials Characterization courses and one course from a list of Thermodynamics courses. The rest of the hours will consist of at least 12 hours of courses drawn from an exhaustive list of elective courses. Research for Credit (9990) in any department will be taken for up to 51 credit hours to reach the minimum overall 72 credit-hour graduation requirement.

Required Course		**3**
PHYSCS 8140	Introduction to Materials Science and Engineering	3
Two Additional Core Courses, One from Each of the Lists Below		**6**
Materials Characterization		
CHEM 8160	Organic Spectroscopy	3
CHEM 8260	Surface Analysis and Characterization	3
BIOL_EN 8370	Materials Characterization Techniques	3
CV_ENG 8610	Materials and Measurement	3
MAE 8001	Advanced Topics in Mechanical and Aerospace Engineering	3
Thermodynamics		
MAE 8380	Advanced Thermodynamics	3
CHEM 8340	Statistical Mechanics	3
CH_ENG 8451	Advanced Chemical Engineering Thermodynamics I	3
Electives		**12**

In addition to the three courses, students must complete twelve addition graduate-level elective courses, at least two of which must be at the 8000-level to ensure a total of 15 credits or more are taken at this level to meet the requirement set by the Graduate School. The list of these courses can be readily provided by the Director of Materials Science & Engineering Graduate Studies.

Qualifying Exam

The Ph.D. Qualifying Exam will consist of earning a grade of B or better in Introduction to Materials Science & Engineering (PHYSCS 8140) and two other core/elective courses within the first three semesters in the program. Students who fail this standard will be placed on probation and given one additional semester to meet this course-based grade requirement. Additionally, during the third semester, each MSE doctoral graduate student will need to have established a Program of Study Committee (termed “Committee”) to which the student will provide a written research report covering their research progress to date that they will defend orally at least one week later. The Committee will assess the student’s research progress to date, ability to understand and communicate materials science and engineering concepts, and capacity to answer questions related to foundational and applied knowledge associated with their work. Students who fail the written and/or oral components will be given up to six weeks to revise their materials and complete one or both parts of the exam again. If the student fails any component twice, they will be terminally transferred to the Master’s program, to be established shortly after the creation of the doctoral program.

Comprehensive Exam

The Ph.D. Comprehensive Exam will occur once the doctoral student has completed approximately one-half to two-thirds of their research for their dissertation. This exam will consist of creating a written report in the same format as the dissertation including a literature review, research chapters, and a work to be completed chapter that they will defend orally at least one week later. The Committee will assess the quantity and quality of the student’s work to date as well as their research plan for completing their dissertation. The Committee will also evaluate the candidate’s ability to think critically and independently. Students who do not pass the written and/or oral components will be given up to twelve weeks to revise their materials and complete one or both parts of the exam again. If the student fails any component twice, they will be terminally transferred to the Master’s program, to be established shortly after the creation of the doctoral program.

Final Exams

The Ph.D. Final Exam will occur once all doctoral research has been completed and formulated into a finalized dissertation. This written document will be defended orally at least two week later. The Committee will assess the completeness and excellence of the student’s work as well as the student’s ability to justify and defend their research. Students who do not pass the written and/or oral components will be given up to twelve weeks to revise their materials and complete one or both parts of the exam again.