Materials Science, MS

Degree: Master of Science
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Admission Requirements

General requirements of the School of Graduate Studies (see Admissions Information section of this catalog) must be satisfied. In addition, students admitted to the graduate Materials Science Program are assumed to have background training in chemistry, mathematics, physics, and possibly biology and engineering, depending upon the student's research interests. Students should realize that if deficiencies exist, some additional undergraduate courses may be required. The time required to complete the degree may then be proportionately increased.

Program Objective

The Materials Science Ph.D. Program of The University of Alabama System (UAS) is an interdisciplinary doctoral program linking the three universities that make up the University of Alabama System: The University of Alabama (UA), University of Alabama at Birmingham (UAB), and The University of Alabama in Huntsville. The program was deliberately constructed without erecting new Materials Science departments on the three campuses. This approach combined the strengths of the various campuses and their resources. Each student selects a program of study in a research program. The course offerings straddle departmental as well as campus boundaries. The qualifying examinations are administered jointly by all three campuses. However, subsequent exams and the student's program of study are controlled by the home campus. The student's doctoral committee must contain at least one faculty member from a sister campus. Our primary object is to prepare our graduates to enter the workforce or pursue further graduate programs.

Learning Outcomes

Materials Science students will

• Acquire a comprehensive knowledge of materials science at an introductory graduate level
• Perform semi-independent research (M.S. Plan I students)
• Develop project management skills

Research

Research in Materials Science focuses on the fundamental relations that exist between the structure of materials on the one hand, and properties and the methods for synthesizing and processing these materials on the other; otherwise known as the materials triangle. The material may be a metal, a ceramic, or a polymer, and it may be dispersed in the solid, liquid or gaseous state. Depending upon the desired application, the structure of the material may have to be investigated at the nuclear, atomic, molecular, granular, or larger length scales. The property that is determined by the structure may be mechanical, electrical, magnetic, optical, thermal, chemical, or biological. Synthesizing may be done by thermal, mechanical, photochemical, electrochemical, or biological processes. Many basic academic disciplines can be fruitfully applied to the solution of materials science problems. Among them, we note particularly chemistry, physics, biology, and engineering. Faculty members guiding students in the Materials Science Program represent all four of these areas.

Master of Science

The University of Alabama in Huntsville offers a Master Degree in Materials Science which is not available at the other campuses.

Master of Science Degree Requirements

General requirements of the School of Graduate Studies under Plan I or Plan II must be satisfied. The M.S. degree is a general degree in materials science. As such, it is based upon a core sequence of courses emphasizing areas of materials science.

Plan I

This plan requires 24 semester hours of graduate coursework, which must include a core consisting of:
MTS 502  STRUC COMP PROP MATLS II  3  
MTS 660  INTRO SOLID ST PHY I  3  
CH 640  ADV CHEMICAL THERMODYNAMICS  3  
CH 642  ADV CHEMICAL DYNAMICS  3  

Select one of the following:  3  
CH 521  CHEMICAL INSTRUMENTATION  
CH 560  
MTS 601  NATURE OF MATERIALS  

Select a minimum of 6 additional semester hours of graduate coursework in Materials Science  6  
MTS 699  MASTER'S THESIS  6  
MTS 780  MATERIALS SCIENCE SEMINAR  1  

Total Semester Hours  28  

1  Students should also register for MTS 780 during every semester they are in residence at UAH.

Additional Information
At least 50% of the coursework must be at the 600-level or above. A program of study must be planned in consultation with a member of the materials science faculty serving as a temporary advisor assigned by the program director. After a student following Plan I selects a thesis topic and thesis supervisor, a supervisory committee will be appointed. This committee should consist of three members of the materials science faculty including the thesis supervisor as chair. A student must complete a written thesis and successfully defend it by an oral presentation before the supervisory committee.

Plan II
This plan requires 33 or more semester hours of graduate coursework in Materials Science or a related discipline to include the 15 semester hour Materials Science core:

MTS 502  STRUC COMP PROP MATLS II  3  
MTS 601  NATURE OF MATERIALS  3  
MTS 660  INTRO SOLID ST PHY I  3  
CH 640  ADV CHEMICAL THERMODYNAMICS  3  
CH 642  ADV CHEMICAL DYNAMICS  3  

Total Semester Hours  15  

Students must also register for MTS 780 during every semester in which they are in residence at UAH. Half of any graduate coursework taken must be at the 600-level or above. A program of study must be planned in consultation with a member of the materials science faculty serving as an advisor assigned by the program director. To fulfill the requirement of a final comprehensive exam, the student must pass one of the three sections of the Materials Science Ph.D. Program Exam I. This plan is typically followed, but not unique to, by students who are in the Ph.D. program.