

# Materials Science, MS

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Degree: Master of Science

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## Admission Requirements

General requirements of the Graduate School (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.

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## Program Objective

The program objective of the Materials Science program is to educate students in the classroom and laboratory so that their technical skill set and knowledge is enhanced through laboratory research and didactic courses such that graduates have the ability to contribute to organizations that perform research or contribute to the research enterprise through education, policy or manufacturing.

The Materials Science MS Program at The University of Alabama in Huntsville is an interdisciplinary masters program that "focuses on the general application of mathematical and scientific principles to the analysis and evaluation of the characteristics and behavior of solids, including internal structure, chemical properties, transport and energy flow properties, thermodynamics of solids, stress and failure factors, chemical transformation states and processes, compound materials, and research on industrial applications of specific materials." The University of Alabama in Huntsville MS in Materials Science is not part of the tri-campus program. Students receiving a master's degree in materials science may be based in one of several departments including chemistry, physics, chemical engineering and mechanical engineering. In the majority of cases, students receive their masters in materials science as part of their doctoral program. Students are encouraged to pursue the thesis option as it enhances the student's technical skill set, exposes them to new research opportunities and makes them more attractive to employers.

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## 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
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## 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.

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## Master of Science Degree Requirements

General requirements of the Graduate School 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 in addition to 6 hours of Master's Thesis (MTS 699). The 24 semester hours of graduate course work is comprised of the 4 core classes listed in addition to 4 electives. The electives are tailored to a student's area of research and are selected in consultation with their advisor.

Code	Title	Semester Hours
MTS 660	INTRO SOLID ST PHY I	3
MTS 602	PROPERTIES OF MATERIALS	3
CH 640	ADV CHEMICAL THERMODYNAMICS	3
CH 642	ADV CHEMICAL DYNAMICS	3
Select a minimum of 4 graduate coursework electives in Materials Science		12
<b>Total Semester Hours</b>		<b>24</b>

Students should also register for MTS 780 (1 semester hour) two semesters while they are in residence at UAH, although these credits do not apply toward the 30 credit hours required for the MS degree. Nominally this would be the first and last semester in the program.

### Additional Information

At least 63% 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 30 or more semester hours of graduate coursework in Materials Science or a related discipline which includes the 15 semester hour Materials Science core classes listed. The remaining 15 semester hours are tailored to a student's area of research and are selected in consultation with their advisor.

Code	Title	Semester Hours
<b>Core Course Listing</b>		
MTS 601	NATURE OF MATERIALS	3
MTS 602	PROPERTIES OF MATERIALS	3
MTS 660	INTRO SOLID ST PHY I	3
CH 640	ADV CHEMICAL THERMODYNAMICS	3
CH 642	ADV CHEMICAL DYNAMICS	3
<b>Total Semester Hours</b>		<b>15</b>

Students should also register for MTS 780 (1 semester hour) two semesters while they are in residence at UAH, although these credits do not apply toward the 30 credit hours required for the MS degree. Nominally this would be the first and last semester in the program.

### Additional information

At least 63% of the graduate 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 an advisor assigned by the program director.