MATERIALS SCIENCE & ENGINEERING

Requirements

Materials science and engineering is a broad field of study. As the name implies, it encompasses foundational knowledge from the sciences (e.g. physics, chemistry, and biology) and it includes the engineering application of this knowledge to create new materials and to select, modify, and combine existing materials in novel and useful ways. Developments in materials science and engineering are critical to success in many areas of science and technology. The relationship between the structure, processing, and properties of materials is central to the discipline, and therefore the courses in this minor teach students about one or more of these areas. Rose-Hulman Institute of Technology offers a Minor in Materials Science and Engineering to recognize students who have gained experience in these areas while at Rose-Hulman. Students in any degree program are eligible for this minor, except students working toward the minor in Solid State Physics/ Materials Science.

To earn the Minor in Materials Science and Engineering, a student must complete a minimum of 24 credit hours according to the guidelines below. These guidelines are designed to be flexible in order to accommodate students from different majors across the Institute. Consequently, some courses are listed in multiple categories even though any given course may only be counted once toward the minor. In some cases, a prerequisite may be waived if the instructor determines that the student has sufficient background knowledge from previous coursework taken in other departments. Prerequisites are included for reference but are subject to change; the course catalog contains the official prerequisites.

Some courses below have prerequisites. Review each course for prerequisite requirements.

1. **One of the following introductory courses (or course sequences):**

Code	Title	Hours
BE 233 & BE 315	Biomaterials and Biomedical Engineering Lab I	5
CHE 315	Materials Science and Engineering	4
ME 328	Materials Engineering	4

2. **A total of 20 additional credit hours from one or both of the following categories.** Any course required for a student's major (excluding elective courses required for the major, and other exceptions as specified in the footnotes) does not count toward these 20 credit hours, nor does any course taken to satisfy requirement (1) above.

Code	Title	Hours
Select a minimum of 12 credit hours of the following elective courses:		12
BE 233	Biomaterials	
BE 560	Tissue-Biomaterial Interactions [1]	
BE 597	Selected Topics for Graduate Students (& Other BE) [1]	
CE 320	Civil Engineering Materials [2]	
CHE 315	Materials Science and Engineering [3]	
CHE 441	Polymer Engineering	
CHE 515	Nanomaterials Science & Engineering	
CHEM 581	Polymer Chemistry [1]	
CHEM 582	Physical Properties of Polymeric Materials [1]	
CHEM 270 & CHEM 470 & CHEM 570	Special Topics in Chemistry and Special Topics in Chemistry and Special Topics in Chemistry [5]	
ECE 416/ CHE 405/ NE 410/ ME 416	Introduction to MEMS: Fabrication & Applications	
ECE 543	Electromagnetic Metamaterials	
NE 280	Introduction to Nanoengineering	
NE 330	Material Failure	
NE 380	Nanotechnology, Entrepreneurship & Ethics	
ME 328	Materials Engineering [3]	
ME 423	Fatigue [1]	
ME 424	Mechanics of Composites [1]	
ME 517	Mechanics of Metal Forming [1]	
ME 497	Special Topics in Mechanical Engineering (& Other ME) [1]	
OE 360	Optical Materials	
PH 255	Foundations of Modern Physics	
PH 405	Semiconductor Materials & Applications	
PH 407	Solid State Physics	
PH 440	X-rays & Crystalline Materials	
With permission of a minor advisor, up to four credit hours of:		
PH 113	Physics III [4]	
EM 204	Statics & Mechanics of Materials II [4]	
BE 222	Mechanics of Materials [4]	
With permission of a minor advisor, up to four credit hours of independent study and/or self-directed research		
Select a maximum of 8 credit hours of the following elective courses that focus on mechanics of materials:		8
EM 505	Theory of Elasticity	
ME 422	Finite Elements for Engineering Applications	
ME 522	Advanced Finite Element Analysis	
CE 523	Advanced Solid Mechanics	

1 Tentative plans for electives can be found on department-specific https://my.rose-hulman.edu pages.

2 CE majors may count CE 320 Civil Engineering Materials toward fulfillment of the minor even though it is in category (2)

3 CHE 315 Materials Science and Engineering and ME 328 Materials Engineering cannot both count toward fulfillment of the minor

4 PH 113 Physics III or EM 204 Statics & Mechanics of Materials II or BE 222 Mechanics of Materials cannot be taken as a terminal course. A materials elective that requires PH 113 Physics III or EM 204 Statics & Mechanics of Materials II or BE 222 Mechanics of Materials as a prerequisite must also be taken in fulfillment of minor requirements.

5 May count more than one Chemistry Special Topics course toward minor.

The Departments of Mechanical Engineering, Chemical Engineering, and Biology and Biomedical Engineering each have their own Materials Science and Engineering minor advisor.