

**Physical Metallurgy (PME)****Minor in Physical Metallurgy****Department of Materials Science and Engineering, College of Engineering and Applied Sciences**

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**Physical Metallurgy (PME)**

The Department of Materials Science and Engineering offers the minor in Physical Metallurgy, suitable for Engineering Science students or for non-Engineering Science students who seek to obtain a more thorough understanding of the engineering sciences. Physical metallurgy is the study of the structure of metals and its influence on material properties and performance. It is an essential component of many areas of mechanical, manufacturing, civil, and materials engineering in the aerospace, automobile, transportation, energy, environmental, biomedical, and electronics industries as well as in engineering research and design for military and government applications. The courses in the minor provide the student with a broad introduction to the engineering science principles and applications associated with physical metallurgy.

Computer Engineering, Engineering Science, Electrical Engineering, Mechanical Engineering, and Applied Mathematics and Statistics students can assemble a sequence of courses with 18 to 24 credits to satisfy an Engineering Science minor. Courses used to satisfy the requirements of the minor may not be used to satisfy requirements of another minor in Engineering Science. The student's program must be approved by the undergraduate program director.

**Requirements for the Minor in Physical Metallurgy (PME)**

Completion of the minor requires 18 to 24 credits.

Requirements for students majoring in Engineering Science (ESG):

1. ESM 334 Materials Engineering  
ESM 335 Strength of Materials  
ESM 353 Biomaterials: Manufacture, Properties, and Applications

2. Four courses chosen from:  
ESG 201 Engineering Responses to Society  
ESM 325 Diffraction Techniques and Structure of Solids  
ESM 488 Cooperative Industrial Practice  
ESM 499 Research in Materials Science  
MEC 305 Heat and Mass Transfer

Requirements for all other students:

1. ESG 201 Engineering Responses to Society
2. ESG 100 Introduction to Engineering Science or MEC 101 and 102 Engineering Computing and Problem Solving I, II or ESE 123 Introduction to Electrical and Computer Engineering
3. ESM 334 Materials Engineering  
ESM 335 Strength of Materials  
ESM 353 Biomaterials: Manufacture, Properties, and Applications
4. Two courses chosen from:  
ESM 488 Cooperative Industrial Practice or ESM 499 Research in Materials Science  
ESM 325 Diffraction Techniques and Structure of Solids

No courses are associated with this academic program.