

Fundamentals of Materials Science

By

Prof. Qiang Guo, Prof. Kolan M. Reddy, Prof. Jing Liu, Shanghai Jiao Tong University

“Fundamentals of Materials Science” is one of the core modules for university/college students in the discipline of materials and metallurgy. In this course that contain 68 recorded lectures, the focus is on the internal relationships among the processing, microstructure, properties and performance for three different types of materials: metals, ceramic and polymer physics. The course provides guidance for materials design and application and lays a solid theoretical foundation for subsequent courses, including the Thermodynamics of Materials, Kinetics of Materials, Mechanical and Functional Properties of Materials, and etc. The pre-recorded mini-lecture series will be complemented by synchronous tutorials and Q & A sessions.

The following are the contents of the course.

1. Introduction. 1 lecture
2. Atomic bonding and crystal structure. 8 lectures
3. Crystal defects. 9 lectures
4. Mechanical properties. 13 lectures.
5. Recovery and recrystallization. 4 lectures.
6. Diffusion. 8 lectures.
7. Phase diagrams. 16 lectures.
8. Phase transformations. 9 lectures.