科目ナンバリング	U-LAS12 10031 LE57						
授業科目名<英訳>	Fundamentals of Materials I-E2 Fundamentals of Materials I-E2			担当者所属職名・氏名	工学研究科　准教授　GAO, Si		
群	自然科学科目群	分野(分類)	物理学(基礎)		使用言語	英語	
旧群	B群	単位数	2単位	週コマ数	1コマ	授業形態	講義（対面授業科目）
開講年度・開講期	2026・前期	曜時限	木2	配当学年	主として1・2回生	対象学生	理系向

[授業の概要・目的]

This is the first half of a two-semester course Fundamentals of Materials. The purpose of this course is to give a concise but comprehensive introduction covering all major classes of materials to the students majored in physical engineering. The characteristics of all main classes of materials - metals, polymers and ceramics, as well as their physical properties, are explained with reference to real-world examples. In the first semester we will firstly introduce the elements and atomic structure, and then mainly focus on the structure and mechanical properties of metallic materials.

[到達目標]

Students are expected to have a broad understanding of fundamental aspects of metallic materials, such as atomic microstructure, microstructures and mechanical properties of metallic materials by taking this course.

[授業計画と内容]

Week 1. Introduction to materials and materials science
Week 2. Atomic structure and interatomic bonding
Week 3. Structure of crystalline solids
Week 4-5. Imperfections in solids
Week 5. Diffusion
Week 6-7. Mechanical properties of metals
Week 8. Strengthening mechanisms in crystalline materials
Week 9. Failure of materials
Week 10. Phase diagrams
Week 11. Phase transformations
Week 12-13. Engineering alloys
Week 14. Characterization techniques of the materials

A total of 14 lectures and one feedback class will be given.

[履修要件]

特になし

[成績評価の方法・観点]

Attendance and class participation [60%]
Homework assignments [40%]

[教科書]

使用しない

[参考書等]

（参考書）
William D. Callister, David G. Rethwisch, 『Materials Science and Engineering: An Introduction』（John Wiley & Sons Inc）ISBN:1118319222

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[授業外学修（予習・復習）等]

Assignment (Quiz) are set for the review after class. The necessary time for assignments is around 1.5 hours for each class.

[その他（オフィスアワー等）]

[主要授業科目（学部・学科名）]