

Material Engineering

2 units (selection)

Kenichi Yoshida · PROFESSOR / MECHANICAL SCIENCE, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING, Hitoshi Takagi · PROFESSOR / MECHANICAL SCIENCE, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class acquires the knowledge on solidification and growth, transformation, heat treatment, thermomechanical treatment in materials, material structure control and composite materials

Outline) Recent research development is remarkable in the material field. Solidification and growth of materials, transformation, heat treatment and thermomechanical treatment will be introduced from the point of engineering view based on material science. Also up-to-date topics will be lectured on material structure control and composite materials. Practices and reports will be imposed in each chapter to evaluate results of students. This subject is related to industrial problems.

Style) Lecture

Keyword) *the study of failure, material structure control, environment-friendly composites*

Relational Lecture) “[Physical properties of materials](#)”(0.3), “[Theory and Application of Non-traditional Machining and Metal Forming Processes](#)”(0.5)

Requirement) Students are required to be interested in materials and have the good understanding of material science in an undergraduate course.

Goal)

1. To understand the structural control of materials
2. To understand the mechanics of composites and the benign technology for environment

Schedule)

1. Introduction to the study of failure
2. Material engineering and ethics for engineers
3. Innovation of material processing toward environmentally benign society
4. Barrier-free processing and treatment of impurity elements
5. Construction of deformation process suppressing deteriorating effects of impurities in steel material
6. High-strain rate flexible forming of aluminum and magnesium alloys
7. Material structure control due to the thermomechanical treatment of steel materials
8. Up-to-date material structure control technology

9. Concept of composite materials

10. Characteristics of composite materials

11. Functions of composite materials

12. Rule of mixture (modulus of elasticity)

13. Rule of mixture (stress)

14. Environmental problem and recycle of composite material

15. Environment-friendly green composites

16. Regular test

Evaluation Criteria) Regular test result 100%

Textbook)

◇ Not used (Yoshida).

◇ Will be introduced in the class (Takagi).

Reference) Will be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=216667>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Yoshida (M619, +81-88-656-7358, yoshida@me.tokushima-u.ac.jp) [MAIL](#)
(Office Hour: Thursday and Friday, 17:00 to 18:00)

⇒ Takagi (M620, +81-88-656-7360, takagi@me.tokushima-u.ac.jp) [MAIL](#)
(Office Hour: Friday 17:00-18:00)