奈良先端大学院大学
シラバスシステム

Core Solid State Physics Ⅰ B (3026)

■ Basic course information

Course type	Foundation Subjects	**Teacher training course**	Science
Number of Credits	1	**Required・Elective etc.**	Elective
Style	Lecture	**Main Language**	English
Scheduling	III	**Subject Registration System**	Use
Taking registration period	2018/10/02～2018/10/16	**Taking cancellation time limit**	2018/11/01

■ Registration Category

Education Programs	**IS**	**CB**	**BS**	**BN**	**MS**	**CP**	**DS**
Registration Category	△	△	△	○	□	○	○
Core Subjects	–	–	–	–	C	–	–
Registration requirements	・Take 12 or more credits from Basic Subjects and Specialized Subjects ・In the Program of Materials Science and Engineering, selectively take the core subjects of either Core Solid State Physics I and Core Solid State Physics II, or Core Molecular Science I and Core Molecular Science II. Additionally, take two or more subjects from core subjects of Biomaterials Chemistry, Semiconductor Materials, Optoelectronics, and Organic Synthesis and Polymer Science.						

■ Overview

Supervising lecturer	Takayuki Yanagida
Lecturer	Takayuki Yanagida, Noriaki Kawaguchi
Learning Objectives	Physical properties such as electrical conduction, optical characteristics, magnetism, etc., are based on the electron states in solid materials. This course will explain the electron movement and the energy band in solids, which are important for understanding various physical properties of solid materials.
Instructional Activities	The aim of this course is to provide students with a basic understanding of solid state physics. This course consists of 8 lectures that are listed below. Your total score for this course will be based on your test scores and written homework.

■ Course plan

Number	Date [Time]	Theme	Content
1	11/1 [1]	Crystal structure and bonding	Periodicity of crystal, unit lattice, ionic bond, metal bond, covalent bond, hydrogen bond, ionic radius
2	11/1 [2]	Wave diffraction and reciprocal lattice	Bragg's law, Laue function, structure factor, Miller indices of crystal planes
3	11/1 [5]	Elasticity of solids	Strain and stress, elastic wave equation, propagation of elastic waves in solids
4	11/2 [1]	Lattice vibrations	Vibrations of monoatomic lattices, phonon dispersion relation, phonon momentum
5	11/2 [2]	Fermi-Dirac distribution	Statistical mechanics, thermodynamics, entropy, free energy, chemical potential, Fermi-Dirac distribution, Boltzmann distribution, Bose-Einstein distribution
6	11/2 [5]	Energy dispersion relations	Energy dispersion relations, specific heat, reciprocal space
7	11/8 [3]	Electronic states in solids	Quantum mechanics, densities of states in 1, 2, and 3 dimensions, Fermi energy
8	11/8 [5]	Energy bands	Energy bands in crystals, Brillouin zone, empty lattice approximation, total number of electrons and occupied states, energy gap, standing wave, Bloch's theorem, approximate solution near a zone boundar

■ Schedules

Number	Date	Time	Room	Note
1	11/1	1	F106	
2	11/1	2	F106	
3	11/1	5	F106	

4	11/2	1	F106	
5	11/2	2	F106	
6	11/2	5	F106	
7	11/8	3	F106	
8	11/8	5	F106	

■ Textbook/Reference book

Textbook	・Charles Kittel, Introduction to Solid State Physics, 8th edition, Wiley. ・Handouts will be provided as nesessary.
Reference book	・Ibach, Harald, Lüth, Hans, Solid-State Physics: An Introduction to Principles of Materials Science, 4th edition, Springer.

■ Other information

Prerequisites	None
Office hour	Contact by email to decide dates
Grading	・Evaluated as S, A, B, C, or D ・Evaluated by examination, exercise or homework report.
Related subjects	Core Solid State Physics II
Related Degree	Science、Engineering
Notice	None

■ Lecture related URL

There is no data by which indication is possible.

■ Handouts

There is no data by which indication is possible.