Course Information

COURSE INFORMATION

Course Title	Code	Semester	L+U Hour	Credits	ECTS
Introduction to Solid State Physics	FZK323	5. Semester	3 + 0	3.0	7.0

Prerequisites	None
Language of Instruction	English
Course Level	Bacheclor's Degree (First Cycle)
Course Type	Elective
Mode of delivery	Face to face
Course Coordinator	Assoc. Prof. Dr. Kıvanç SEL
Instructors	
Assistants	
Course Objectives	The aim of thsi course is to help students learn the basics of solid state physics.
Course Content	Crystal structure, Reciprocal lattice, x-ray crystallography, Determination of Crystal Structures by X-Ray Diffraction, Crystal binding and elastic constant, Phonons I: Crystal vibrations, Phonons II: Thermal Properties
Course Learning Outcomes	1) Apply the knowledge of natural sciences 2) Interpret the basics concepts, such as Crystal Binding, Crystal Structures and Defects, Crystal Diffraction, Reciprocal Lattice; Atomic Displacements and Phonons, Vibrational Modes, Thermal Properties. 3) Identify problems in the field of solid state physics 4) Follow the developments of Solid State Physics on both national and international level 5) Explain natural phenomena 6) Solve field related problems

WEEKLY COURSE CONTENT

Week	Topics	Teaching and Learning Methods and Techniques	Study Materials
1. Week	Crystal structure: Periodic Array of Atoms, Lattice Translation Vectors, Basis and the Crystal Structure,	Lecture and recitation	
2. Week	Primitive Lattice Cell, two and Three-Dimensional Lattice Types	Lecture and recitation	
3. Week	Miller Index Systems for Crystal Planes	Lecture and recitation	
4. Week	Simple Crystal Structures, Sodium Chloride Structure, Cesium	Lecture and	

Quick Access

Physics
- Qualification Awarded
- Level of Qualification
- Qualification Requirements and Regulations
- Specific Admission Requirements
- Recognition of Prior Learning
- Profile of the Program
- Program Key Learning Outcomes
- Occupational Profile of Graduates
- Access to Further Studies
- Course Structure & Credits
- Exam Regulations & Assessment & Grading
- Graduation Requirements
- Mode of Study
- Programme Director(or Equivalent)
- Evaluation Questionnaire
- TYYÇ

Course Information
- Course Information
- Weekly Course Content
- Resources
- Course Category
- CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAMME OUTCOMES
- ECTS credits and course workload

	Chloride Structure, Hexagonal Close-Packed Structure (hcp), Diamond Structure, Cubic Zinc Sulfide Structure	recitation	
5. Week	Wave diffraction and the reciprocal lattice: Diffraction of Waves by Crystals, Bragg Law,	Lecture, recitation and homeworks	
6. Week	Reciprocal Lattice, refraction conditions and Laue equations.	Lecture and recitation	
7. Week	Brillouin Zones, sc, bcc and fcc Lattices.	Lecture and recitation	
8. Week	Midterm exam	Written exam	
9. Week	Structure Factor of the sc Lattice, Structure Factor of the bcc Lattice, Structure factor of the fcc Lattice, Atomic Form Factor	Lecture and recitation	
10. Week	Crystal structure, Van der Waals-London Interaction, Ionic Crystals, Covalent Crystals, Metals, Hydrogen, Bonds, Atomic Radii, Ionic Crystal Radii	Lecture and recitation	
11. Week	Phonons I: Vibrations of Crystals with Mono-atomic Basis, First Brillouin Zone, Group Velocity	Lecture and recitation	
12. Week	Phonon Momentum, Inelastic Scattering by Phonons	Lecture, recitation and homeworks	
13. Week	Phonons II: Phonon Heat Capacity, Planck Distribution, Density of States in One Dimension, Density of States in Three Dimensions	Lecture and presentation	
14. Week	Debye Model for Density of States, Debye T3 Law, Einstein Model of the Density of States,	Lecture and presentation	
15. Week	Thermal Conductivity, Thermal Resistivity of Phonon Gas	Lecture and presentation	
16. Week	Final exam	Written exam	

RESOURCES

Recommended Sources
‘Introduction to Solid State Physics’, Kittel Charles, John Wiley & Sons, Inc., 047141526X (ISBN-13: 978-0471415268), 2004
‘Katıhal Fiziğine Giriş’, Karaoğlu, B. İstanbul, Güven Kitap Yayın Dağıtım, 1996, 9750203305
'Katıhal Fiziğine Giriş', Tahsin N. Durlu, Bilim Yayıncılık, 1996, 9755560009

ASSESSMENT

Measurement and Evaluation Methods and Techniques
Written exam, homework and presentations. (60% Final, 30% midterm, 10% homework and presentation)

COURSE CATEGORY

Course Category	Percentage
Core Courses	% 100

CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAMME OUTCOMES

Programme Outcomes	Contribution Level	DK1	DK2	DK3	DK4	DK5	DK6
PY1	4	4	4	4	4	4	4
PY2	5	5	5	5	5	5	5
PY3	3	3	3	3	3	3	3
PY4	4	4	4	4	4	4	4
PY5	5	5	5	5	5	5	5
PY6	4	4	4	4	4	4	4

PY7	3	3	3	3	3	3	3
PY8	2	2	2	2	2	2	2
PY9	4	4	4	4	4	4	4
PY10	4	4	4	4	4	4	4
PY11	3	3	3	3	3	3	3
PY12	2	2	2	2	2	2	2
PY13	3	3	3	3	3	3	3
PY14	3	3	3	3	3	3	3
PY15	3	3	3	3	3	3	3

*DK = Course's Contrubution.

	0	1	2	3	4	5
Level of contribution	None	Very Low	Low	Fair	High	Very High

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ECTS CREDITS AND COURSE WORKLOAD

Event	Quantity	Duration (Hour)	Total Workload (Hour)
Class Hours (14 weeks)	14	3	42
Final Exam Preparation	1	28	28
Mid Term Exam Preparation	1	27	27
Further Study	14	3	42
Final Exam	1	2	2
Mid Term Exam 1	1	2	2
Assignment 1	1	18	18
Assignment 2	1	18	18
		Total Workload	179
		Total Workload / 25.5 (s)	7.02
		ECTS Credit of the Course	7