Course Information								
Course Code	**T**	**P**	**L**	**C**	**ECTS**	**Type** C/E	**Language** TR/ENG etc.	**Year/Semester**
FİZ3019	**3**	**0**	**0**	**3**	**5**	**E**	**TR**	**3/FALL**
Course Name (Turkish**)**	**Yoğun Madde Fiziği**							
Course Name (English**)**	**Condensed Matter Theory**							

Unit/Program	Physics Department/Undergraduate Program
Course Prerequisite	No
Course Objectives	To comprehend the potential of electron shielding and interatomic pairs in simple liquid metal systems.
Course Outline	Crystal Structure, Crystal Defects, Crystal Bonding, Lattice Vibrations of Crystals, Band Theory, Optical Properties of Solids, Magnetic Properties of Solids, Superconductivity
Textbook/ Material / Resources	Pseudopotansiyel in the Theory of Metals, Walter A. Harrison, W.A. Benjamin, Inc 1966
Internship Status	No

Course Precedents

University Name	**Program Name**	**Course Name**	**T-P-L-C; ECTS**	**Type**
Marmara University	**Physics**	**Condensed Matter Physics**	**3-0-0-3-5**	**E**
Atılım University	**Physics**	**Condensed Matter Theory**	**3-0-0-3-5**	**E**

The instructor who proposed the course (Title, Name and Surname)	*Signature*
Instructors who can teach the course (Title, Name and Surname)	*Signature*

Academic justification for the opening of the course? (The effect of course outcomes on program outcomes, etc.)

Brief explanation of the course (theoretical lecture, applications, laboratory, studio, off-campus activity, using software, etc.)

Face-to-face courses will be taught under the supervision of the relevant faculty member.

External Stakeholder Opinions About the Course (It is expected that the opinions to be obtained from the business world that will employ your graduates or from real or legal persons outside the University who have expertise on the subject of the course will be specified. Proof documents must be attached to this form.)

Stakeholder Name	**Opinion** (It should be given as a summary, it should not exceed two lines.)

Weekly Course Content Distribution		
Week	**Theory**	**Application/Laboratory**
1	Crystal structure: Unit and primitive cell, Types of crystal lattices and their symmetries, Miller indices	
2	Simple crystal structures, Crystal defects. Crystal bonding: Ionic, covalent, metallic, hydrogen and Van der Waals attachment	
3	Crystal Diffraction: Diffraction conditions, Experimental X-ray diffraction methods, Counterlatticing and properties	
4	Lattice Dynamics: Lattice vibrations of crystals containing one-dimensional atoms of one type and atoms of two different genera	
5	Lattice vibrations of three-dimensional real crystals, Density of states, Phonons, Thermal properties of lattice	
6	Electrons in metals: Classical free electron theory-Drude model, Quantized free electron theory, Free electron Fermi gas and thermal, electrical properties	
7	Band theory: The effect of periodic lattice potential and the emergence of energy bands	
8	Classification of crystals. Semiconductors: Semiconductor materials and semiconductivity properties	
9	Midterm Exam	
10	Band spacing, Gaps, Doping of semiconductors, Charge carrier density in pure and doped semiconductors, Hall phenomenon	
11	Optical properties of solids: Plasmon, Polariton and polarons, Excitons	
12	Magnetic properties of solids: Diamagnetism, Paramagnetism, Ferromagnetism, Antiferromagnetism	
13	Superconductivity: Formation of superconductivity, Magnetic properties of superconductors, London equation	
14	Other properties and thermodynamics of superconductors, BCS theory of superconductivity.	
15	Final Exam	
16		

Assessment			
Evaluation Criteria	**Activity**	**Custom**	**Contribution to Success Grade (%)**
	Midterm Exams	1	40
	Quizzes		
	Assignments		
	Projects		
	Term Paper		
	Laboratory		
	Other		
	Final Exam	1	60
		Sum:	100
Remarks			

Content Design and Subject Weight (%)	Mathematics and Basic Sciences	90
	Engineering Sciences	10
	Social Sciences	
	Health Sciences	
	Educational Sciences	
	Culture and Art Sciences	
	Design Information	

Workload (ECTS) Calculation			
Events	**Number**	**Duration (Hours)**	**Total workload (Hours)**
Fieldwork			
Midterm Exam Application	1	2	2
Self-Study (including pre-class and exam preparation)	14	2	28
Make-up Exam	1	2	2
Experiment and Observation			
Class Participation (Theory)	14	3	42
Homework			
Final Exam Practice	1	2	2
Laboratory			
Article Review			
Writing an Article			
Reading			
Case Study			
Performance			
Problem Solution			
Project Preparation			
Project Submission			
Quiz			
Report Preparation			
Submitting Reports			
Role/Drama Work			
Seminar			
Oral Exam			
Team/Group Work	12	3	36
Argument	14	1	14
Application/Practice			
Other			
TOTAL WORKLOAD:			**126**
ECTS CREDİTS OF THE COURSE: *(The number obtained as a result of Total Workload/25 is calculated by rounding to the whole number.)*			**5**

Program Outcomes (PO) / **Learning Outcomes (LO)** *(Course Outcomes)*		1	2	3	4	5	6	7	8	9	10	11
1	Gain the necessary theoretical knowledge about the basic physical properties of solids	**5**	**5**	**5**	**4**	**3**	**3**	**4**	**5**	**5**	**3**	**3**
2	Classifying solids and their crystal structures	**5**	**5**	**5**	**4**	**3**	**3**	**4**	**5**	**5**	**3**	**3**
3	To develop awareness of technological applications related to the basic physical properties of solids	**5**	**5**	**5**	**4**	**3**	**3**	**4**	**5**	**5**	**3**	**3**

Organizer: Prof. Dr. Mediha KÖK
Preparation Date: 20.05.2024