

Solid Lab.

# Course Book – (4th Year Physics– General and Applied Branch)

**Lecturer's name**

**Prof. Dr. Mustafa Saeed Omar Assist. Prof. Dr. Tariq .A. Abbas**

**M.Sc. Jala muhamed Ahmed**

**M.Sc. Sarwin Yaseen Hussein**

**M.Sc. Diman Abdulla**

**M.Sc. Zmrood Asos Othman**

**Academic Year: 2020/2021**

Course Book (Lab)

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| 1-Course Name | Solid state (lab.) |
| 2-Lab. Staff | MSc Prof. Dr. Mustafa Saeed Omar Dr.Tariq Abdul-Hameed AbbasM.S.c. Sarwin yasin Hussein |
| 3-Department/ College | E-mail: Sarwin.hussein@su.edu.krdWebsite: https://sites.google.com/a/su.edu.krd/sarwin-yassin-hussein/ |
| 4-Contact | Practical: 3 |
| 5-Time(In hours) per week | **Tuesday(8:30 –11:30)am,(11:30-2:30),(2:30-5:30)pm****Wednesday (11:30 am – 2:30) pm****Thursday (8:30 – 11:30) Am** |
| 6-Office Hours | At least10 h/week |
| 7- Course Code | n/a |
| 8- Teacher's academic profile | Istudiedfor anundergraduate degreeinPhysicsscienceatSalahaddin University-Erbil between the years of 2003-2006. After graduation in 16-5- 2007 I got a position in Salahaddin University as a laboratory demonstrator (Solid Lab,generalphysicslab,atomiclabandElectriclab). Istayedwith the job for more than 9 year. In 2012 .I obtained MSc in thin film preparation. The title of my MSc dissertation was about effect of Substrate Temperature andCopper salt Concentration onStructural and Optical Properties of Sprayed Cu2ZnSnS4 thin film..28-5-2013 Assistance Lecturer in University of Salahaddin- College of science physics department - Erbil -IraqFor academic year 2016-2017 I've taught Semiconductor physics for fourthyear Physics studentin Physic department andsolid state lab for medical and general fourth year Physics student. |
| 9- Keywords | N/A |

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| 10- **Course Overview:**The Solid Statelabisone oftheimportant lab for Physics student to1. Distinguish type of solid material (metal, semiconductor and insulator).
2. Understanding the behavior of material under electric, magnetic and temperature effects , 3- We will try to give the information about how external energy can interact with mater.
3. The most important subjects student can get information will lead to understand electronic thermal properties of solids such as thermal conductivities and thermoelectric power as well as calculating the energy band structure in solids.
4. By understanding hall effect, X-ray diffraction and electron diffraction student can get information about crystal stricture interplanier distance and lattice constant.
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| 11- **Course Objective:**Solid State lad Physics is one of the important lab which serves students in Physics, Inorganic chemistry, Materials Science, Mechanical Engineeringandelectronicengineering forunderstanding theformation andelectronic properties of solid materials. In Medical Physics people needs to understand how solid materials can be used to detectradiation signalssuchasX-ray, Gammarayandcosmicray.Understanding Solid Statewill alsohelpto understand howinstruments such as CT scan, MR imaging, digital camera, photo detectorsand manyother similar instruments are working. The information will also give abilities to people to improve their mind to understand and build new instruments..This field in interring all subjects fromphysics, Howto understand thisnew technology, we need to understand the type of materials ( metal ,semiconductor ,insulator ) by solid state lab physics .We need to understand its formation and properties as well its application. |
| 12- **Student's obligation**Normally, students obliged toattend all thelectures and takenotesduring the experiment. Inaddition, inlab participationwouldbeabonusofthestudentstowidentheirknowledge andunderstand themodule thoroughly.During this year the student must be report about experiment. |
| 13- **Forms of Teaching**In solid state laboratory, the staff members of within the first week will explain the outlines of the lab, andall experiments aswellastheregulation andpoliciesto befollowed bythestudentinside thelab. Toperform the experiment safely. The lab as a whole accommodates seven experiments per a week, since each group consists of at least 14 students, then every two student make one experiment altogether in one week. In this manner the student will complete the experiments cyclically in the course. Foreach performed experiment the student should prepare a scientific report given to the staff in the next week. The student will asks to make at least one seminar relevant to the solid laboratory experiments in which all the students will participate in the |

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| discussions and evaluations. |
| **14- Assessment scheme**(All exams have 20 marks+ 30 final exam), (everyweek each student prepared the report about the experiment 10%) (During this year the student must make one seminar 2.5%), (quizzes 2.5%)10% + 2.5% + 2.5%+ 5% one semester examination = 20% +30% final exam |
| 15- Student Learning Outcome:Solid State Physics make students to understand how condensed matter; behave in their thermal and electrical properties. Help the students after graduation to get work in areas of electronics and devices as well as places regarding X-ray images and CT-can centres since a part of the solid state physics subject, they have to study the X- ray crystallography and the formation of matter. |
| 16- **Course Reading list and References:**1-Principles of Solid State Physics, 1974 *R. A. Levy*, 2- Introduction to Solid State Physics, 8th Edition 2008 *C. Kittel*3-Solid State Physics, 2nd Edition 1988 *J S Blakemore* |
| **17- The Topics** | **Lecture's Name** |
| **Exp.1 : *Electron Diffraction from Single Crystal*** | Prof. Dr. Mustafa Saeed Omar Assist. Prof.Dr.TariqAbdul Hameed AbbasM.S.c. Sarwin Yassin Hussein**Week (2)** |
| **Exp.2 : *Resistivity in metal*** | Prof. Dr. Mustafa Saeed Omar Assist. Prof. Dr. Tariq .A. AbbasM.S.c. Sarwin Yassin Hussein**Week (3)** |
| **Exp.3** : ***Hall Effect in Metals*** | Prof. Dr. Mustafa Saeed Omar Assist. Prof. Dr. Tariq .A. AbbasM.S.c. Sarwin Yassin Hussein**Week (4)** |
| **Exp.4: *Dielectric Constant of Solids.*** | Prof. Dr. Mustafa Saeed Omar Assist. Prof. Dr. Tariq .A. AbbasM.S.c. Sarwin yasin Hussein**Week (5)** |

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| **Exp.5 : *Optical Absorption in Semiconductors*** | Prof. Dr. Mustafa Saeed Omar Assist.Prof.Dr.Tariq.A.AbbasM.S.c. Sarwin Yassin Hussein**Week (6)** |
| **Exp.6 : *X-Ray Diffraction From Single Crystal*** | Prof. Dr. Mustafa Saeed Omar Assist.Prof.Dr.Tariq.A.AbbasM.S.c. Sarwin Yassin Hussein**Week (7)** |
| **Exp.7 : *Thermoelectric power*** | Prof. Dr. Mustafa Saeed Omar Assist.Prof.Dr.Tariq.A.AbbasM.S.c. Sarwin Yassin Hussein**Week (8)** |
| **Exp.8: *Energy Gap of Semiconductors Measured by Thermal Method.***. | Prof. Dr. Mustafa Saeed Omar Assist.Prof.Dr.Tariq.A.AbbasM.S.c. Sarwin Yassin Hussein**Week (9)** |
| **Exp.9: *Measurement of susceptibility of liquid by Quince's method.*** | Prof. Dr. Mustafa Saeed Omar Assist.Prof.Dr.Tariq.A.AbbasM.S.c. Sarwin Yassin Hussein**Week (10)** |
| **Exp.10: *X-ray powder photography.*** | Prof. Dr. Mustafa Saeed Omar Assist.Prof.Dr.Tariq.A.AbbasM.S.c. Sarwin Yassin Hussein**Week (11)** |

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| **Exp.11: *Dielectric constant in solids.*** | Prof. Dr. Mustafa Saeed Omar Assist. Prof. Dr. Tariq .A. AbbasM.S.c. Sarwin yasin Hussein**Week (12)** |
| **Exp.12: *Thermoelectric power.*** | Prof. Dr. Mustafa Saeed Omar Assist. Prof. Dr. Tariq .A. AbbasM.S.c. Sarwin yasin Hussein**Week (13)** |
| **Exp.13: *Magneto resistance.*** | Prof. Dr. Mustafa Saeed Omar Assist. Prof. Dr. Tariq .A. AbbasM.S.c. Sarwin yasin Hussein**Week (14)** |
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| **20. Extra notes:**Here thelecturer shall write anynote or comment thatis not coveredin this template andhe/she wishes to enrich the course book with his/her valuable remarks. |
| **21. Peer reviewپێداچوونهوهی هاوهڵ**This course book has to be reviewed and signed by a peer. The peer approves the contents of your course book by writing few sentences in this section.*(A peer is person who has enough knowledge about the subject you are teaching, he/she has to be a professor, assistant professor, a lecturer or an expert in the field of your subject).*ئهم کۆرسبووکه دهبێت لهاليهن هاوهڵێکی ئهکاديميهوه سهير بکرێت و ناوهڕۆکی بابهتهکانی کۆرسهکه پهسهند بکات و جهند ووشهيهک بنووسێتلهسهر شياوی ناوهڕۆکی کۆرسهکه و واژووی لهسهر بکات.هاوهڵ ئهو کهسهيه که زانياری ههبێت لهسهر کۆرسهکه و دهبيت پلهی زانستی له مامۆستا کهمتر نهبێت. |