

**Solid State Lab.**

**Course Book**

**(4th Year Physics– General and** **Applied Branch)**

**Lecturer's name:**

Dr. Tariq Abbas

**Academic Year: 2022/2023**

Course Book (Lab)

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| 1-Course Name | Solid State Lab. |
| 2-Lab. Staff | Prof. Dr. Mustafa Saeed Omar  Prof. Dr.Tariq Abdul-Hameed Abbas  MSc. Jala Muhamed  MSc. Sarwin yasin Hussein  MSc. Zmrood asos othman  MSc. Diman Mohammed Abdullah |
| 3-Department/ College | E-mail: [@su.edu.krd](mailto:diman.abdullah@su.edu.krd)  Website: https:// |
| 4-Contact | Practical: 3 |
| 5-Time (In hours) per week | Wednesday  (8:30am-12:30) pm General branch  (12:30 am – 2:30) pm Communication branch |
| 6-Office Hours | At least10 h/week |
| 7- Course Code |  |
| 8 Teacher's academic profile |  |
| 9- Keywords |  |

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| 10- **Course Overview:**  The Solid-State lab is one of the important labs for Physics student to  1-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.  4- 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.  5- By understanding hall effect, X-ray diffraction and electron diffraction student can get information about crystal stricture interplanar distance and lattice constant. |
| 11- **Course Objective:**  Solid State lad Physics is one of the important labs which serves students in Physics, Inorganic chemistry, Materials Science, Mechanical Engineering and electronic engineering for understanding the formation and electronic properties of solid materials. In Medical Physics people needs to understand how solid materials can be used to detect radiation signals such as X-ray, Gamma ray and cosmic ray. Understanding Solid State will also help to understand how instruments such as CT scan, MR imaging, digital camera, photo detectors and many other 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 from physics, how to understand this new 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 to attend all the lectures and take notes during the experiment. In addition, in lab participation would be a bonus of the students to widen their knowledge and understand the module thoroughly. During this year the student must be make 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, and all experiments as well as the regulation and policies to be followed by the student inside the lab. To perform 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 students make one experiment altogether in one week. In this manner the student will complete the experiments cyclically in the course. For each performed experiment the student should prepare a scientific report given to the staff in the next week. The student will ask to make at least one seminar relevant to the solid laboratory experiments in which all the students will participate in the discussions and evaluations. |

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| **14- Assessment scheme**  (All exams have 20 marks+ 30 final exam), (every week 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 centers 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 by 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. Tariq. A. Abbas  MSc.Jala  MSc. Diman Mohammed Abdullah  **Week (2)** |
| **Exp.2: *Resistivity in metal*** | Prof. Dr. Tariq. A. Abbas  MSc.Jala  MSc. Diman Mohammed Abdullah  **Week (3)**  **Week (3)** |
| **Exp.3:** ***Hall Effect in Metals*** | Prof. Dr. Tariq. A. Abbas  MSc.Jala  MSc. Diman Mohammed Abdullah  **Week (4)** |
| **Exp.4: *Dielectric Constant of Solids.*** | Prof. Dr. Tariq. A. Abbas  MSc.Jala  MSc. Diman Mohammed Abdullah  **Week (5)** |
| **Exp.5: *Optical Absorption in***  ***Semiconductors*** | Prof. Dr. Tariq. A. Abbas  MSc.Jala  MSc. Diman Mohammed Abdullah  **Week (6)** |
| **Exp.6: *X-Ray Diffraction From***  ***Single Crystal*** | Prof. Dr. Tariq. A. Abbas  MSc.Jala  MSc. Diman Mohammed Abdullah  **Week (7)** |
| **Exp.7: *Thermoelectric power*** | Prof. Dr. Mustafa Saeed Omar  M.S.c. Sarwin Yassin Hussein  MSc. Diman Mohammed Abdullah  **Week (8)** |
| **Exp.8: *Energy Gap of Semiconductors***  ***Measured by Thermal Method.*** | Prof. Dr. Mustafa Saeed Omar  M.S.c. Sarwin Yassin Hussein  MSc. Diman Mohammed Abdullah  **Week (9)** |
| **Exp.9: *Measurement of susceptibility of liquid by Quince's method.*** | Prof. Dr. Mustafa Saeed Omar  M.S.c. Sarwin Yassin Hussein  MSc. Diman Mohammed Abdullah  **Week (10)** |
| **Exp.10: *X-ray powder photography.*** | Prof. Dr. Mustafa Saeed Omar  M.S.c. Sarwin Yassin Hussein  MSc. Diman Mohammed Abdullah  **Week (11)** |
| **Exp.11: *Magneto resistance.*** | Prof. Dr. Mustafa Saeed Omar  M.S.c. Sarwin Yassin Hussein  MSc. Diman Mohammed Abdullah  **Week (12)** |

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| **20. Extra notes:**  Here the lecturer shall write any note or comment that is not covered in this template and he/she wishes to enrich the course book with his/her valuable remarks. |
| **ڵهواه یهوهنووچادێپreview Peer 21.**  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).*  تێسوونب کهيهشوو دنهج و تاکب دنهسهپ هکهسرۆک یناکهتهباب یکۆڕهوان و تێرکب ريهس هوهيميداکهئ یکێڵهواه نهيلاهل تێبهد هکووبسرۆک مهئ  .تاکب رهسهل یووژاو و هکهسرۆک یکۆڕهوان یوايش رهسهل  .تێبهن رتمهک اتسۆمام هل یتسناز یهلپ تيبهد و هکهسرۆک رهسهل تێبهه یرايناز هک هيهسهک وهئ ڵهواه |

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