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|--------------|-----|---|-----|----------------------|
| Course Title | ( ) | 2 | ( ) | Solidstate Physics 2 |
|--------------|-----|---|-----|----------------------|

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| ( )<br>Lecturer            | ( )                                       | / /<br>(Course No. /)                | 000284/<br>/3                       |
| ( /HP)<br>Contact No.      |   | /<br>(Class Hour/Venue)              | 09:00-10:30 ( 405)                  |
| (Course Prerequisite)      | Quantum Physics and Solid State Physics 1 | (Target Student)                     | Senior                              |
| E-mail<br>(E-mail Address) |   | /Office Hour<br>(Office/Office Hour) | Young Sil Kwan 110/Tue. 10:30-11:00 |

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| (Objectives)                                 | This course is introductory solid state physics for seniors of the physical sciences. In the years since the first lecture was presented the field has developed vigorously, and there are notable applications. The challenge to the lecture has been to treat significant new areas while maintaining the introductory level of the lecture. It would be a lucky to present such a physical field as a homework. In this semester we will study five topics which include energy band, semiconductor, metal, superconductor, and magnetism. In the first half of the semester most of lecture will be focused on basic concept of energy band based on quantum physics. In the second half of the semester we will focus on semiconductor and various materials by employing quantum mechanics. The subjects which have been treated in this semester will be applied to diverse new materials. |
| CQI<br>(Continuous Quality Improvement Plan) | Continuous feedback and discussion  |
| (Text book & References)                     | Introduction to Solid State Physics by C. Kittel,<br>Solid State Physics by N. W. Ashcroft and N. D. Mermin   |
| (Assignment book)                            | Introduction to applied solid state physics by R. Dalven, (Plenum)  |
| (Lecture Methods)                            | Lecture using ppt and video. Quiz based on the schedule.  |
| (Assignment)                                 | Homework will be assigned regularly   |
| (Reading Materials)                          | Read a textbook and a reference book before class.  |
| 가<br>(Course Grading)                        | [ 가] (%) : 30, (%) : 30, 가 (%) : 30, (%) : 10,  |
| (Etc.)                                       |   |

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| (Week) | (Course Contents)  | (Etc.) |            |
|--------|--|--------|------------|
| 1      | Free electron fermi gas 1  |        |            |
| 2      | Free electron fermi gas 2  |        |            |
| 3      | Energy bands and Nearly free electron model  |        | Quiz 1     |
| 4      | Kronig-Penny model, wave equation in periodic potential, wave equation in periodic potential                           |        | Homework 1 |
| 5      | Semiconductor crystals-Band gap, equation of motion and effective mass etc.  |        | Quiz 2     |
| 6      | Semiconductor-intrinsic carrier concentration, semiconductor-impurity conductivity                                     |        | Homework 2 |
| 7      | Fermi surfaces and metals-construction of Fermi surfaces, orbits, Fermi surfaces and metals-calculation of energy band |        |            |
| 8      | Midterm exam.  |        |            |

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| (Week) | (Course Contents)   | (Etc.) |            |
|--------|---|--------|------------|
| 9      | Fermi surfaces and metals-experimental methods in Fermi surface 1, 2                                  |        | Homework 3 |
| 10     | Occurrence of superconductivity, Destruction of superconductivity of magnetic fields, Meissner effect |        | Quiz 3     |
| 11     | Microwave and infrared properties, Isotope effect, thermodynamics of the superconducting transition   |        | Homework 4 |
| 12     | London equation, coherence length, BCS theory, flux quantization and vortex state                     |        | Quiz 4     |
| 13     | Josephson effect, macroscopic quantum interference  |        | Homework 5 |
| 14     | Diamagnetism and paramagnetism  |        | Quiz 5     |
| 15     | Ferromagnetic order, magnons, antiferromagnetic order and domains                                     |        | Homework 6 |
| 16     | Final exam  |        |            |

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| <p style="text-align: center;">가<br/>1<br/>(Additional<br/>Guide1)</p> | <p style="text-align: center;">( )</p> <p>Students who require special assistance (including special needs students) may contact their professors during the first week of the semester to discuss issues related to attendance, lectures, assignments and exams and request learning assistance.</p> |
| <p style="text-align: center;">가<br/>2<br/>(Additional<br/>Guide2)</p> |   |