# ADVANCED SOLID STATE II

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| 1 | Course Title: | ADVANCED SOLID STATE II | |
| 2 | Course Code: | FZK5304 | |
| 3 | Type of Course: | Optional | |
| 4 | Level of Course: | Second Cycle | |
| 5 | Year of Study: | 1 | |
| 6 | Semester: | 2 | |
| 7 | ECTS Credits Allocated: | 6.00 | |
| 8 | Theoretical (hour/week): | 3.00 | |
| 9 | Practice (hour/week): | 0.00 | |
| 10 | Laboratory (hour/week): | 0 | |
| 11 | Prerequisites: | Quantum Mechanics, Solid State Physics, Mathematics, Electricity and Maagnetism | |
| 12 | Language: | Turkish | |
| 13 | Mode of Delivery: | Face to face | |
| 14 | Course Coordinator: | Prof. Dr. Mürsel Alper | |
| 15 | Course Lecturers: | Doç Dr. Mürşide Hacıismailoğlu | |
| 16 | Contact information of the Course Coordinator: | malper@uludag.edu.tr, 0 224 29 41 1692, UÜ Fen Edebiyat Fakültesi, Fizik Bölümü 16059 Görükle Kampüsü Bursa | |
| 17 | Website: | - | |
| 18 | Objective of the Course: | To investigate Fermi Surfaces of solids, magnetic and ferroelectrical properties, alloy structures, Phase diagrams, Nanostructures and superconductivity | |
| 19 | Contribution of the Course to Professional Development: | Learning both bulk and nanostructure properties of metals, alloys and superconducting materials and analyzing them. | |
| 20 | Learning Outcomes: | | |
| | | 1 | Learn spin waves and polarisation |
| | | 2 | Learn ionic crystal vibrations and Landau model |
| | | 3 | Learn piezoelectric and Bloch theorem |
| | | 4 | Learn electron, neutron and magnetic radiation in solids |
| | | 5 | Learn Fermi levels and density of state |
| | | 6 | Learn two-dimensional electron gas and quantum Hall effect |
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| 21 | Course Content: | | |

**Course Content:**

| Week | Theoretical | Practice |
|---|---|---|
| 1 | Spin waves | |
| 2 | Polarisation | |
| 3 | Ionic crystal vibrations | |
| 4 | Landau model | |
| 5 | Piezoelectric | |

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|---|---|---|
| **6** | Bloch theorem | |
| **7** | Radiation in solids | |
| **8** | Electron, neutron and magnetic radiation | |
| **9** | Fermi levels | |
| **10** | Density of state | |
| **11** | Two-dimensional electron gas | |
| **12** | Quantum Hall effect | |
| **13** | General repeat and problem solution | |
| **14** | Problem solution | |

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| **22** | Textbooks, References and/or Other Materials: | 1) Introduction to Solid State Physics, C. Kittel, 1986, John Wiley & Sons Inc. ISBN: 0-471-87474-4<br>2) Katıhal Fiziği, I.R.Hook, H.E.Hall, 1991, John Wiley & Sons Ltd. |
| **23** | Assesment | |

| **TERM LEARNING ACTIVITIES** | **NUMBER** | **WEIGHT** |
|---|---|---|
| Midterm Exam | 0 | 0.00 |
| Quiz | 0 | 0.00 |
| Home work-project | 0 | 0.00 |
| Final Exam | 1 | 100.00 |
| Total | 1 | 100.00 |

| Activites | Number | Duration (hour) | Total Work Load (hour) |
|---|---|---|---|
| Theoretical | 14 | 3.00 | 42.00 |
| Practicals/Labs | 0 | 0.00 | 0.00 |
| Self study and preperation | 12 | 5.00 | 60.00 |
| Homeworks | 10 | 5.00 | 50.00 |
| Projects | 5 | 6.00 | 30.00 |
| Field Studies | 0 | 0.00 | 0.00 |
| Midterm exams | 0 | 0.00 | 0.00 |
| Others | 0 | 0.00 | 0.00 |
| Final Exams | 1 | 2.00 | 2.00 |
| Total Work Load | | | 184.00 |
| Total work load/ 30 hr | | | 6.13 |
| ECTS Credit of the Course | | | 6.00 |

Contribution of Final Exam to Success Grade 100.00

Measurement and Evaluation Techniques Used in the The system of relative evaluation is applied.

**24 ECTS / WORK LOAD TABLE**

| **25** | **CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS** | | | | | | | | | | | | | | | |
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| | **PQ1** | **PQ2** | **PQ3** | **PQ4** | **PQ5** | **PQ6** | **PQ7** | **PQ8** | **PQ9** | **PQ10** | **PQ11** | **PQ12** | **PQ13** | **PQ14** | **PQ15** | **PQ16** |
| **ÖK1** | 5 | 4 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 4 | 4 | 5 | 0 | 0 | 0 | 0 |
| **ÖK2** | 3 | 5 | 5 | 5 | 4 | 4 | 4 | 3 | 5 | 5 | 4 | 5 | 0 | 0 | 0 | 0 |
| **ÖK3** | 5 | 4 | 4 | 5 | 5 | 5 | 4 | 4 | 5 | 5 | 4 | 5 | 0 | 0 | 0 | 0 |
| **ÖK4** | 5 | 5 | 5 | 3 | 5 | 5 | 3 | 4 | 3 | 4 | 4 | 5 | 0 | 0 | 0 | 0 |

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| **ÖK5** | 5 | 5 | 5 | 3 | 5 | 5 | 3 | 4 | 3 | 4 | 5 | 5 | 0 | 0 | 0 | 0 |
| **ÖK6** | 5 | 5 | 5 | 4 | 5 | 4 | 4 | 5 | 5 | 5 | 5 | 4 | 0 | 0 | 0 | 0 |

**LO: Learning Objectives PQ: Program Qualifications**

| **Contribution Level:** | **1 very low** | **2 low** | **3 Medium** | **4 High** | **5 Very High** |
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