Engineering of Correlated Electron Matter

2 units (selection)

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Target〉 Lecture would be given on the basic concept of magnetism and superconductivity in condensed matter with an introductory talk on strongly correlated electron system and its application to technology.

Outline〉 Some materials with strongly correlated electrons show interesting magnetic and electronic phenomenon such as high-transition temperature superconductivity, metal-insulator transition and giant magneto-resistance. After an introductory talk on the strongly correlated electron system and its application to technology, lecture would be given on the basic concept of magnetism and superconductivity in condensed matter.

Style〉 Lecture

Keyword〉 ***strongly correlated electron, magnetism, superconductivity***

Notice〉 授業を受ける際には，2 時間の授業時間毎に 2 時間の予習と 2 時間の復習をしたうえで授業を受けることが，授業の理解と単位取得のために必要である．

Goal〉 To understand the basic concept of magnetism and superconductivity in condensed matter

Schedule〉

1. Correlated electron matters
2. Introduction to magnetism
3. Electronic states of atoms
4. Magnetic ions in crystal
5. Magnetic interaction
6. Local-moment magnetism 1
7. Local-moment magnetism 2
8. Itinerant-electron magnetism
9. Ferromagnet and its application to technology
10. Superconducting phenomenology
11. Electron-phonon interaction
12. Magnetic flux quantum and SQUID
13. Type II superconductor
14. New type of superconductivity
15. Manganese oxide and spintronics
16. Examination

Evaluation Criteria〉 Examination

Textbook〉 no specific text

Contents〉 http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=216619