

**Module: Elective Advanced Lectures:
BCGS Courses**

Module No.: physics70d

Course:



Superconductivity (E/A)

Course No.:

Category	Type	Language	Teaching hours	CP	Semester
Elective	Lecture	English	2	3	ST

Requirements for Participation:

Preparation:

Basic knowledge in condensed matter physics

Form of Testing and Examination:

Oral examination

Length of Course:

1 semester

Aims of the Course:

Understanding of the fundamental aspects of superconductivity.

Contents of the Course:

The lecture provides an overview of the fundamental aspects of superconductivity, theoretical description and technological applications, including the following topics:

Basic experimental facts and critical parameters
 Phenomenological description: London equations
 Ginzburg-Landau theory
 Magnetic flux quantization
 Type I and type II superconductors, characteristic length scales, vortices
 Microscopic description: BSC theory
 Electron-phonon interaction, Cooper pairs
 Josephson effects
 Applications of superconductivity in science, transport, and medicine
 Brief introduction to unconventional superconductivity with recent examples

Recommended Literature:

J. F. Annett: Superconductivity, Superfluids and Condensates (2004)
 M. Tinkham: Introduction to Superconductivity (1996)
 V. V. Schmidt: The Physics of Superconductors (1997)
 J. R. Waldram: Superconductivity of Metals and Cuprates (1996)
 D. R. Tilley and J. Tilley: Superfluidity and Superconductivity (1990)