

**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)