

# **Basic Aspects of Superconductivity**

July 1 – 17, 2019

Mondays, Wednesdays, and Fridays

Time: 10:00 – 11:40 am

Place: Room 203, Building 5, New Sciences Complex, Minhang Campus, SJTU

## **Instructor**

Prof. Tony Leggett

Email: [aleggett@illinois.edu](mailto:aleggett@illinois.edu), [ajleggett@sjtu.edu.cn](mailto:ajleggett@sjtu.edu.cn)

## **Recitation Instructor**

Prof. Ying Liu

## **Teaching Assistant**

Yushen Yang

## **Outline**

Together with the “Experimental Superconductivity” course, this 1-credit course at Shanghai Jiao Tong University (SJTU) will cover basic aspects of superconductivity. The course is intended for physics and physics related majors who have taken general physics and other core physics courses typically towards the end of their junior year. A list of topics to be covered in this course is given below in the *Course Calendar*.

## **Reference books**

1. C. Kittel, Introduction to Solid State Physics, 8th Ed., John Wiley & Sons, Inc., 2005.
2. A. J. Leggett, Lecture Notes on Superconductivity.

**Office hours:** To be announced.

## **Grading**

The numerical grade will be determined by the following distribution:

Homework: 70%

Summary of the course: 30%

## **Organization**

- 1) You're expected to participate in the accompanying course, “Experimental Superconductivity” and participated in the course projects in that course.

- 2) You are expected to read materials to be discussed in class before the lectures. Topics to be discussed in each class are listed in the class calendar.
- 3) Homework sets and the course summary must be turned in on time to receive full credits.
- 4) All class activities will be conducted in English.
- 5) The course summary should be written in English, and 3-page long (12-pt font size, 1.5-line spacing).
- 6) Occasional recitation sessions for Q&A (Prof. Ying Liu) will be offered if needed.

**Course Calendar:**

<b>Date</b>	<b>Contents</b>	<b>Homework/tasks</b>
<b>Week 1</b>	<b>Monday, 7/1.</b> Experimental survey and general quantum and statistical considerations ( <b>Prof. Leggett</b> ) <b>Wednesday, 7/3.</b> BEC and superconducting state wave functions ( <b>Prof. Leggett</b> ) <b>Friday, 7/5.</b> BCS theory ( <b>Prof. Leggett</b> )	
<b>Week 2</b>	<b>Monday, 7/8,</b> Effects of alloying ( <b>Prof. Leggett</b> ) <b>Wednesday, 7/10.</b> Exotic superconductivity ( <b>Prof. Leggett</b> ) <b>Friday, 7/12.</b> Josephson effect ( <b>Prof. Leggett</b> )	- Homework due on Friday, 6/1)
<b>Week 3</b>	<b>Monday, 7/15.</b> Applications of superconductivity ( <b>Prof. Leggett</b> ) <b>Wednesday, 7/15,</b> Course summary and discussion ( <b>Prof. Ying Liu</b> ).	- Course summary due Wednesday, 6/6