

Course number	U-LAS70 10002 SE50				
Course title (and course title in English)	ILAS Seminar-E2 :A stroll around materials chemistry - Superconducting materials (材料化学の散歩道 - 超伝導体) ILAS Seminar-E2 :A stroll around materials chemistry - Superconducting materials	Instructor's name, job title, and department of affiliation	Graduate School of Engineering Associate Professor, Yi Wei		
Group	Seminars in Liberal Arts and Sciences	Number of credits	2	Number of weekly time blocks	1
Class style	seminar (Face-to-face course)	Year/semesters	2024・First semester		Quota (Freshman) 15 (15)
Target year	Mainly 1st year students	Eligible students	For all majors		Days and periods Thu.5
Classroom	23, Yoshida-South Campus Bldg. No. 1			Language of instruction	English
Keyword	Superconductivity / Magnetic expulsion / High-temperature superconductors / Sensitive magnetometers / Superconducting electromagnets				

[Overview and purpose of the course]

Amazing superconducting materials are one kind of substance exhibiting zero electrical resistance and magnetic exclusion at certain conditions. They can be metals, ceramics, or organic materials. This course will introduce the superconducting properties (including discovery, phenomena, elementary properties), superconducting materials (conventional and high temperature superconductor), and superconductor applications. It is intended to equip students with a basic understanding of superconductivity, characteristics of various superconductors and advantage of applications. It also aims to encourage students to do active conversation about scientific concept in English.

[Course objectives]

This course aims to equip students with a basic understanding of the superconducting materials, including superconducting properties, phenomena, basic interpretations and applications. The classifications and characteristics of various types of superconductors will be comprehended.

[Course schedule and contents]

The number of lectures as shown in 【 】 .

1.Discovery and development 【 1 】

2.Basic properties of superconductor 【 2 】

Absolutely zero electrical resistance

Perfect diamagnetism

3.Superconducting phenomena and interpretation 【 4 】

Critical phenomena in superconductor

Flux trapped in superconductor

Tunneling effect of supercurrent

Pairing electrons

4.superconducting materials 【 5 】

Elements and alloys superconductors
Superconducting MgB₂
Cu-based superconductors
Fe-based superconductors
Superconductors under pressure

5.Applications 【2】

Superconducting magnet
Magnetic resonance imaging (MRI)
Sensitive magnetic detector
Energy storage and transmission

6.Feedback 【1】

[Course requirements]

None

[Evaluation methods and policy]

Class attendance and participation (60%)
Homework(20%)
Presentation and discussion(20%)

[Textbooks]

Not used
Handouts will be provided as necessary

[References, etc.]

(**References, etc.**)
Introduced during class

[Study outside of class (preparation and review)]

Students are expected to participate in the conversations and presentations in class. Their own laptops (or ipads, smartphones, etc.) can be used to search for references and information during discussion sessions in class. It is around one hour to complete the assignments after class.

[Other information (office hours, etc.)]