| Course number | U-LAS10 10023 LE55 | | |
|---|---|---|---|
| Course title (and course title in English) | Quest for Mathematics I-E2<br>Quest for Mathematics I-E2 | Instructor's name, job title, and department of affiliation | Graduate School of Engineering<br>Senior Lecturer,Arseniy Aleksandrovich, Kuzmin |

| Group | Natural Sciences | Field(Classification) | Mathematics(Foundations) |
|---|---|---|---|

| Language of instruction | English | Old group | Group B | Number of credits | 2 |
|---|---|---|---|---|---|

| Number of weekly time blocks | 1 | Class style | Lecture<br>(Face-to-face course) | Year/semesters | 2026・First semester |
|---|---|---|---|---|---|

| Days and periods | Tue.2 | Target year | Mainly 1st & 2nd year students | Eligible students | For all majors |
|---|---|---|---|---|---|

## [Overview and purpose of the course]

In the "Quest for Mathematics", complex numbers and their applications are introduced. At first, we will follow some of the steps of their invention and learn to understand their basic properties. These numbers are very important in many different fields, such as quantum mechanics or electric engineering. In this course we explore geometrical applications of complex numbers, geometrical transformations, and complex functions.

## [Course objectives]

- To understand the origins and importance of complex numbers
- Understanding of the geometric representation of complex numbers
- Learn the complex numbers arithmetic
- Learn the relation between trigonometric and exponential functions
- Acquire the ability to use complex numbers

## [Course schedule and contents)]

In this course the following topics are covered:

1. Introduction and history of complex numbers. Geometric definition of complex numbers.
2. From geometric definition to Bombelli's "wild thought". The Argand plane and modern definitions.
3. Simple complex arithmetic and De Moivre's formula.
4. Equivalence of symbolic and geometric arithmetic.
5. Euler's formula: moving particle argument.
6. Euler's formula: power series argument.
7. Applications: trigonometry.
8. Applications: geometry.
9. Applications: calculus.
10. Applications: algebra.
11. Applications: vector operations.
12. Complex numbers and Euclidean geometry: transformations.
13. Motions and reflections.
14. Similarities and complex arithmetic. Spatial complex numbers.

14 lectures in total and one feedback class.

**Continue to Quest for Mathematics I-E2(2)↓↓↓**

**Quest for Mathematics I-E2(2)**

**[Course requirements]**

No knowledge of complex numbers is required to join this class. All necessary concepts are introduced during the lecture.

**[Evaluation methods and policy]**

Evaluation will be based on:
10% attendance and participation
20% homework
20% quiz
50% final exam

**[Textbooks]**

Not used

**[References, etc.]**

**（References, etc.）**
John Stillwell 『Mathematics and its history』 （Springer）ISBN:978-1-4419-6052-8

**[Study outside of class (preparation and review)]**

Preparation for lectures will include revision of class materials and homework assignments. The work during the semester is most important, it helps to build up the understanding. If you have no problems with homework, there will be no problem solving the tests.

**[Other information (office hours, etc.)]**

**[Essential courses]**