



## "Fun with Prime Numbers: The Mysterious World of Mathematics"

**Instructor:** Tetsushi Ito

See "Meet the Course Staff" section for more details.

### Course Description

Prime numbers are one of the most important subjects in mathematics. Many mathematicians from ancient times to the 21st century have studied prime numbers.

In this math course, you will learn the definition and basic properties of prime numbers, and how they obey mysterious laws. Some prime numbers were discovered several hundred years ago whereas others have only been proven recently. Even today, many mathematicians are trying to discover new laws of prime numbers.

Calculating by a pen and paper, you will explore the mysterious world of prime numbers. Join us as we tackle math problems, and work together to discover new laws on prime numbers. Let's study and have fun!

### Prerequisites

None. Knowledge of high school level algebra is recommended.

### Lectures

Each course will be provided with short lecture videos by the instructor, Tetsushi Ito along with a set of short Problems related to the contents of the lecture videos. By watching the videos and answering the Problems, we hope that all participants will gain some basic knowledge on prime numbers. We also hope that the participants will recognize how prime numbers is, and how little we actually know about it. We welcome questions and comments and hope this will lead to fruitful exchanges and discussion.

### Assignments and Grading Criteria

To earn a certificate for the course, students must mark the score of 60% or more. Grading for the course is as below.

A: 80 -100%

B: 70 - 79%

C: 60 - 69%

F: Below 59%

Problems and Completion Checklist assigned every week, count for 33% (7, 9, 9, 8%, respectively) and 7% (3, 1, 1, 2%, respectively) in total, respectively. During this course, learners are asked to work on four Homework assignments. The total of Homework counts for 40% (10% for each Homework assignment). In Week 3, learners are encouraged to take the Final Exam (20%).

- Problems: 33%
  - Every week (7, 9, 9, 8 points, respectively)
  - Due date: End of each Week
- Completion Checklist: 7%
  - Every week (3, 1, 1, 2 points, respectively)
  - Due date: End of each Week
- Homework 1: 10%
  - Week 1
  - Due date: End of Week 1 (Wednesday January 27, 23:30 UTC)
- Homework 2: 10%
  - Week 2
  - Due date: End of Week 2 (Wednesday February 3, 23:30 UTC)
- Homework 3: 10%
  - Week 3
  - Due date: End of Week 3 (Wednesday February 10, 23:30 UTC)
- Homework 4: 10%
  - Week 4
  - Due date: End of Week 4 (Wednesday February 17, 23:30 UTC)
- Final Exam: 20%
  - Week 3
  - Due date: End of Week 4 (Wednesday February 17, 23:30 UTC)

Certificates will be issued by edX under the name of KyotoUx after the end of the course.

Please pay attention on the due dates of each Problem, Homework, and so on. To avoid any kinds of unexpected troubles including the Internet disconnection, we strongly recommend all learners to submit them with time to spare.

## Course Schedule

Week	Start Date	Topic	Homework
1	January 21	Introduction to Prime Numbers <ul style="list-style-type: none"> <li>• Infinity of prime numbers</li> <li>• Sieve of Eratosthenes</li> <li>• Open problems on prime numbers - The twin prime conjecture and the Goldbach conjecture</li> </ul>	Yes
2	January 28	Laws of Prime Numbers <ul style="list-style-type: none"> <li>• Dirichlet's theorem on arithmetic progression</li> <li>• Fermat's theorems on sums of two squares (1)</li> <li>• Fermat's theorems on sums of two squares (2)</li> </ul>	Yes
3	February 4	Reciprocity Laws and Mystery of Triangles <ul style="list-style-type: none"> <li>• What are reciprocity laws?</li> <li>• Mystery of Triangles (1)</li> <li>• Mystery of Triangles (2)</li> </ul>	Yes
4	February 11	ABC Conjecture and Beyond <ul style="list-style-type: none"> <li>• Prime factorization and the ABC conjecture</li> <li>• Examples of ABC triples</li> <li>• Polynomial analogues of the ABC conjecture</li> </ul>	Yes

This course will end on Thursday, February 18, 2016.



© edX Inc. All rights reserved except where noted. EdX, Open edX and the edX and Open EdX logos are registered trademarks or trademarks of edX Inc.

