

## 代数学特論

2 units (selection)

Yoshinori Mizuno · ASSOCIATE PROFESSOR / ELECTRICAL AND ELECTRONIC SYSTEMS, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

**Target** To learn some combinatorial techniques based on the theory of partitions.

**Outline** A partition of a natural number  $n$  is any non-increasing sequence of natural numbers whose sum is  $n$ . For example, there are three partitions of 3, because  $3=2+1=1+1+1$ . This class introduces some combinatorial techniques and tools such as generating functions based on several topics from the theory of partitions.

**Style** Lecture

**Keyword** *integer partition, generating function*

**Goal** To learn some combinatorial techniques and tools such as generating functions.

**Schedule**

1. Some terms from set theory
2. Euler's identity
3. Ferrars graph
4. Generating function
5. Euler's theorem
6. Two variable generating function
7. Euler's pentagonal number theorem
8. Congruences
9. The Rogers-Ramanujan identities I
10. Formulas of partition functions
11.  $q$ -binomial coefficients
12.  $q$ -binomial theorem
13. Jacobi's triple product identity
14. The Rogers-Ramanujan identities II
15. Applications
16. Summary

**Evaluation Criteria** Assignments count 100%.

**Textbook** Integer partitions. George Andrews, Kimmo Eriksson, Cambridge University Press

**Reference** An introduction to the theory of numbers. G. H. Hardy, E. M. Wright, Oxford University Press

**Contents** <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=218256>

**Contact**

⇒ Mizuno (A204, +81-88-656-7542, [mizuno@pm.tokushima-u.ac.jp](mailto:mizuno@pm.tokushima-u.ac.jp)) MAIL  
(Office Hour: 水曜 17:00 から 18:00)