

**MAS581. TOPICS IN MATHEMATICS:
COMBINATORICS OF COXETER GROUPS**

TITLE. Combinatorics of Coxeter groups (콕세터 군의 조합론)

LECTURER. Philippe Nadeau, CNRS & Université Claude Bernard Lyon 1, France

DATE. 15 (Fri.), 16 (Sat.), 22 (Fri.), 23 (Sat.), May 2015

TIME. 10:30AM – 12:30PM, 2:30PM – 4:30PM

VENUE. Department of Mathematical Sciences, KAIST

ABSTRACT. Coxeter groups are fundamental structures, given by generators and relations, which are closely related to transformation groups of quadratic spaces. In fact finite Coxeter groups are precisely the finite groups of isometries of an euclidean space which are generated by reflections. More generally, the repeated occurrence of Coxeter groups in various domains of algebra, geometry or combinatorics motivates their study.

In these lectures, we will focus on the underlying combinatorial and enumerative questions raised by these groups. We will start with the study of finite reflection groups, and give the classification result based on their Coxeter presentation. Then we will give the main properties of general Coxeter groups, based mainly from the point of view of words. In the last lectures, time permitting, we will study the specific combinatorics of affine Coxeter groups, and give an introduction to the active domain of noncrossing partitions associated to finite Coxeter groups.

LECTURE 1. (May 15, 10h30) Motivating example: the symmetric group

LECTURE 2. (May 15, 14h30) Finite reflection groups and their classification

LECTURE 3. (May 16, 10h30) Coxeter groups and their geometric representation

LECTURE 4. (May 16, 14h30) Basic properties of Coxeter groups

LECTURE 5. (May 22, 10h30) Weak order and reduced decompositions

LECTURE 6. (May 22, 14h30) Affine Coxeter groups

LECTURE 7. (May 23, 10h30) Generalized noncrossing partitions

LECTURE 8. (May 23, 14h30) Exam