

# Math 3121, Abstract Algebra , Fall Semester, 2017

Instructor: **Yongchang ZHU**; Email: mazhu@ust.hk. Office: 3425; Tel: x7447;

Lecture Time and Location: Tu. Thu. 9:00-10:20. Room. 2302

Webpage: <http://www.math.ust.hk/~mazhu/> Office hour: Stop by my office anytime during weekdays.

Tutorial Sections: T1a, Wed. 13:30-14:20, Room 2463,

Tutorial Sections: T1b, Mon, 9:30-10:20, Room 2404,

TA: Zhiming, Li. Email: zliat@connect.ust.hk

## Course Description:

The course covers the following basic topics in algebra: Sets and relations. Groups. Group actions, symmetric groups, symmetry. Rings and related concepts. Fields. Jordan canonical form of square matrices. The requirements for passing the course are (1). Understand basic concepts. (2). Understand the proofs of the main theorems. (3). Apply rigorous and logically correct method to solve problems. A list of more challenging problems will be given to the students who think the homework assignments are too simple.

**Textbook:** J.B. Fraleigh, "A First Course in Abstract Algebra", 7th edition, Addison-Wesley.

**Grading Policy:** Final exam 65%, homework 25%, quiz 10 %

## Course Contents:

Basic set theory. Mappings (Section 0, page 1-4).

Complex numbers and roots of unity (Section 1).

Binary operations (Section 2).

Groups (Section 4).

Subgroups (Section 5).

Cyclic groups (Section 6).

Generating sets and Cayley digraphs (Section 7).

Groups of permutations (Section 8).

Orbits, cycles, and the alternating groups, orbits (section 9).

Lagrange Theorem (Section 10).

Direct products and finitely generated abelian groups (section 11).

Symmetries (section 12).

Homomorphisms (Section 13).

Factor groups (Section 14).

Group action on a set (Section 16).

Rings and Fields (Section 18).

Integral domains (Section 19).

Fermat's and Euler's theorems (Section 20).

The field of quotients of an integral domain (Section 21).

Homomorphisms and factor rings (Section 26).

Jordan canonical form of square matrices (lecture notes).