❒ Undergraduate Program

The Mathematics Division seeks to produce mathematicians who firmly understand a wide range of subjects in pure and applied mathematics, and who are ready to contribute to society by employing knowledge from their specialties. The majority of students graduating with bachelor's degree from the department continue their study of mathematics in the graduate school at KAIST or at other respected domestic and foreign universities. Other graduates begin their careers in industry or in various research institutes. The careers that mathematics majors follow are diverse. Many study to be professional mathematicians, while others pursue graduate studies in fields related to mathematics, and some acquire worthy positions in computer-related companies or insurance firms. In recent years the number of letters requesting recommendations from securities companies and banks that are interested in hiring mathematics majors has been increasing.

❒ Graduate Program

In the master's program, students learn applicable mathematics or study essential mathematics required for a doctoral program. Currently about half of the Department's master's students continue with the doctoral program, while most of the remaining students obtain positions in research institutes.

In the doctoral program, students gain knowledge of advanced mathematics and perform original research. They become well-equipped to be competent mathematics professors or researchers in industry and research institutes who can handle on-scene problems mathematically. About 70% of the graduates of the department's doctoral program currently work as professors of mathematics, computer science, or related fields, while the rest are employed in research institutes or firms.

❒ Research Areas

✐ Analysis and Applied Mathematics

In this area, applications of the results from pure mathematics are employed to solve concrete problems that arise in nature and society from such diverse areas as natural science, engineering, and financial mathematics. Topics include real analysis, complex analysis, ordinary differential equations, partial differential equations, functional analysis, integral equations, financial mathematics, and ergodic theory.

✐ Topology

Here, the structures and the properties of manifolds are studied using algebraic, geometric, and combinatorial methods. Active research areas include (i) knots, links, braids, and 3-manifolds (ii) the geometric structures on low-dimensional manifolds including hyperbolic and discrete group theory (iii) 4-manifolds through Seiberg-Witten theory, symplectic and contact structures, and (iv) symmetries of manifolds in terms of group actions on differential manifolds, algebraic varieties, and semi-algebraic sets. In addition applications are effectively being made to computer graphics and non-commutative cryptography, in which braid groups are used.

✐ Algebra and Number Theory

Work in these areas often involves theoretical problems in algebraic number theory and algebraic geometry, class field theory, modular forms, and representations. Applicable problems in cryptography, coding theory and game theory are also studied using methods in algebraic geometry, number theory and linear algebra.

✎ Geometry

Using differential manifold theory and Riemannian manifolds, those working in geometry study such topics as curvature pinching problems, curvature and group actions, closed geodesics, finiteness theorems, comparison theorems, geometric structure and isometric immersions, harmonic maps and non-linear problems.

✎ Scientific Computational Mathematics

Computational mathematics involves the study of methods of representing complex phenomena as mathematical models and discovering techniques of numerically solving the models. Research is also directed towards theoretical studies based on the analysis and developments of new techniques applicable to science and engineering.

✎ Probability

Here random phenomena in nature and society are studied rigorously in terms of measure theory. Topics include the central limit theorem, stochastic processes, martingales, Markov chains, and stochastic differential equations, together with applications in communications, computer science, and operations research.

✎ Combinatorics

Combinatorics is an area of mathematics that studies mathematical objects having discrete or combinatorial structures. It involves combinatorial problems from various fields of mathematics and allows for the development of theories about diverse combinatorial objects. Emphasis is put on enumerative combinatorics, graph theory and algebraic combinatorics.

✎ Information Mathematics

Topics studied in this field include Shannon's information theory, computation theory, complexity theory, Hoffman code, entropy, data compression, error correcting codes, cryptography, and information security.

✎ Financial Mathematics

The area of financial mathematics involves the study and design of mathematical models of financial derivatives and markets using stochastic integral equations or stochastic differential equations.