❒ Undergraduate Program

In the undergraduate program, students take various courses chosen from a variety of courses offered by the Department, according to their interests and career plan, to learn a broad foundation of mathematical knowledge. Every student has an academic advisor who helps in planning coursework, and one can do an individual study to build research experience under the direction of a professor specializing on the subject of one's choice.

The graduates of the Department of Mathematical Sciences find diverse career paths. Some go on to graduate schools to study and research more mathematics, some take the advantage of applicability of mathematics and enter graduate schools in other fields such as physics, biology, engineering, computer science, finance, business administration and economics, and others begin a career in industry related to communication, information security, computers, securities, insurance, finance and banking.

❒ Graduate Program

In the master's program, students go through advanced level mathematical training in preparation to use mathematics after graduation, or they concentrate on the fundamental mathematics required for more advanced study in the doctoral program. Currently about half of the students in the master's program continue to study mathematics in the doctoral program, while the rest play an active role in industry or government research institutes.

Students learn basics to be experts in mathematical sciences and make plan for their coursework or research according to their own interests. They have opportunities to experience other areas through the various extracurricular activities such as colloquia and exchange programs with foreign universities.

The Department encourages interdisciplinary research with other academic fields. In the master's program there are many students who have not majored in mathematical sciences for bachelor's degree. In fact, students with various backgrounds make valuable and creative research environments.

In the doctoral program, students study more advanced mathematics and produce their own new research results. They are well-trained to be competent mathematicians or researchers in industry and government research institutes. Until now, about 70% of Ph.D. produced in the Department have become professors of mathematics, computer science, or related fields, while the rest have been employed in government research institutes or industry.

❒ Research Areas

✐ Analysis and Applied Mathematics

In this area, real analysis, harmonic analysis, complex variables, ordinary differential equations, partial differential equations, integral equations, operator theory and all analytical problems originating from applied science are studied. Applications of the research results are employed to solve concrete problems that arise in natural science, engineering, and financial mathematics. Computerized tomography(CT) using the Radon transform and image processing using the wavelets are conspicuous applications of analysis.

✐ 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.

✎ Computational Mathematics and Scientific Computing

Computational mathematics involves the study of methods of expressing 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.

✎ 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. Real data from the markets are used to test mathematical models and the techniques to predict the market movements are studied.

✎ Probability and Statistics

In probability, random phenomena in nature and society are studied rigorously in terms of measure theory. Research emphasis is on stochastic process, martingale, Markov chain, stochastic differential equations, queueing theory for the analysis of telecommunication systems, stochastic control theory and optimization. In statistics, emphasis is on multivariate statistical analysis, data analysis, learning theory, neural network models, graphic models, time series analysis, Bayesian analysis, parameter estimation, hypothesis verification, regression analysis, etc.