**수학교육과**

**(DEPARTMENT OF MATHEMATICS EDUCATION)**

**1. Department Introduction**

The Department of Mathematics Education in Graduate School of Yeungnam University offers graduate work leading to Doctor of Philosophy (Ph. D) since March 2010. The Ph. D program intends to bring up a mathematics education specialist who is going to work for at government-related organizations, research institutes, higher educational institutions including secondary schools. This program serves both theoretical knowledge for academic and school mathematics education and practical knowledge for applying to mathematics classrooms. In addition, this program focuses on scientific research methodology for fostering the qualification to be an expert researcher. The focus of the Ph. D program is intended to play a key role in developing theories that improves mathematics teaching and learning methods in secondary schools and doing action research for applying them to mathematics classrooms

**Educational goals**

• Be able to present a new horizon and direction of mathematics education, to develop a theory of mathematics education research practical and creative.

• So as to combine the theoretical knowledge and ability, as an expert in the practical teaching of mathematics in mathematics education theory and the depth of the education of mathematics, through a partnership with the education classroom.

• To train professionals to cultivate the attitude of true as a researcher and professional expertise will lead to strengthening the competitiveness of the regional and national mathematics education, to pursue the development of future-oriented mathematics education.

**2. List of Faculty Members**

▪ Kim, Yong Chan, Professor, Kyungpook National Univ., Ph. D., Analysis

▪ Kim, Jin Hwan, Professor, Yeungnam Univ., Ph.D., Geometry/Mathematics Education.

▪ Cho, Cheong Soo, Professor. Ph.D., Oregon State Univ. Ph. D., Mathematics Education/Technology

▪ Choi, Youngook, Associate Professor, Univ. of California at Riverside, Ph.D., Algebra

▪ Park, Sunyong, Assistant Professor, Seoul National Univ., Ph.D., Mathematics Education

**3. Course Description**

구성주의와 수학교육 CONSTRUCTIVISM AND MATHEMATICS EDUCATION 3 credit

This subject deals with cognitive constructivism, radical constructivism, social constructivism to enhance teacher’s knowledge of epistemology in mathematics education,

수학교육사 HISTORY IN MATHEMATICS EDUCATION 3 credit

This subject is intended to understand a variety of perspectives and approaches to mathematics and enhance mathematical, pedagogical knowledge with the study of origins and historical development of the ideas in mathematics.

수학교육의사회문화심리학 SOCIAL AND CULTURAL PSYCHOLOGY OF MATHEMATICS EDUCATION 3 credit

This subject deals with the working theory of symbolic interaction, social spirit, cultural personality, working culture, enculturation, beliefs, norms and so on.

수학교육철학과인식론 PHILOSOPHY OF MATHEMATICS EDUCATION AND EPISTEMOLOGY 3 credit

The main purpose of this subject lies in the deep understanding of philosophy of mathematics education both in the East and in the West from the ancient to the modern ages. Historical development of educational system, philosophical thoughts of education, and their influences and implications to our modern education are to be understood.

수학철학과수학사 PHILOSOPHY OF MATHEMATICS AND HISTORY OF MATHEMATICS 3 credit

This subject deals with criticism of absolutism, reconceptualization of the philosophy of mathematics, philosophy of mathematics of Wittgenstein and Lakatos, This subject also deals with relation of philosophy and history of mathematics.

개별연구(1) INDEPENDENT STUDY (1) 3 credit

Students consider the theoretical background and previous research related to the theme of the paper.

개별연구(2) INDEPENDENT STUDY(2) 3 credit

Students consider the theoretical background and previous research related to the theme of the paper.

기하학과수학교육 GEOMETRY FOR SCHOOL MATHEMATICS 3 credit

In this course, we discuss on the basic geometry theory from the point of view of mathematics education. This course deals with tangent vectors, directional derivatives and covarient derivatives, isometries on Euclidean space, properties of curves and surfaces.

기하학특강 TOPICS IN GEOMETRY 3 credit

During this course, we discuss special topics in geometry such as Poincare lemma and Gauss Bonnet Theorem.

대수학과수학교육 ALGEBRA FOR SCHOOL MATHEMATICS 3 credit

This course is intended for students to discuss the fundamental concepts of algebra from the point of view of mathematics education. The subject deals with basic number theory, linear algebra, group, ring, and Galois theory. From this course, students can learn those mathematical understanding and increase the skills of teaching algebra in middle or high school. From this course, students can learn those mathematical understanding and increase the skills of teaching algebra in middle or high school.

대수학특강 TOPICS IN ALGEBRA 3 credit

During this course, we discuss special topics in algebra such as Sylow theorem, Galois theory and fundamental theorem for finitely generated Abelian group.

수학교수·학습론 TEACHING AND LEARNING METHODS FOR SCHOOL MATHEMATICS 3 credit

Curriculum for the teaching and learning of school mathematics is widely discussed. This course deals with mathematising, Freudenthal Research, Van Hieles’ level theory in learning geometry, the instructional design, the effective teaching and learning strategies, the role of the affective domain, and the higher mathematical thinking processes.

수학교육과CAS계산기 MATHEMATICS EDUCATION AND CAS CALCULATORS 3 credit

This course deals with computer algebra system (CAS), the relationship of curriculum, the teaching and learning using CAS, the mathematics classroom environment for using CAS, and the assessment using CAS.

수학교육과공학 MATHEMATICS EDUCATION AND TECHNOLOGY 3 credit

This course provides opportunities for using technology in teaching the secondary school mathematics, such as variables and expressions, algebra, functions, calculus, probability and statistics, plane and analytic geometry, vector. In doing so, students will be able to study how to use mathematical process and thinking skills such as experimentation, conjecture and verification, communication and discussion, inductive, discovery, proofs, visualization, reasoning, and representation.

수학교육과정론 THEORY OF CURRICULUM IN SCHOOL MATHEMATICS 3 credit

Students will study various theories of curriculum development and learn the course of school mathematics curriculum and the directions and the views of curriculum of foreign countries. Also, Students will learn the theories of alternative assessments and apply various assessment methods and procedures to secondary school mathematics classroom.

수학교육기초론 FUNDAMENTAL THEORIES IN MATHEMATICS EDUCATION 3 credit

This course mainly reviews the research literature in order to examine the fundamental theory of mathematics education,

수학교육양적연구방법론 QUALITATIVE RESEARCH METHODOLOGY FOR MATHEMATICS EDUCATION 3 credit

This course deals with the purpose of qualitative research methodology for the study of mathematics education, the philosophical background of qualitative research, the qualitative research design, and the qualitative research five methods (narrative, phenomenology, grounded theory, ethnography, and case studies).

수학교육연구동향 RESEARCH TRENDS AND CURRENT ISSUES IN MATHEMATICS EDUCATION 3 credit

The purpose of this course is to set the direction of a dissertation theme through reviewing the recent trends and issues in mathematics education research from the past to the present.

수학교육연구문헌조사법 LITERATURE REVIEWS FOR RESEARCH MATHEMATICS EDUCATION 3 credit

The course investigate the research literature for students in order to develop the theme of the dissertation in the future.

수학교육질적연구방법론 QUALITATIVE RESEARCH METHODOLOGY FOR MATHEMATICS EDUCATION 3 credit

This course deals with the purpose of qualitative research methodology for the study of mathematics education, the philosophical background of qualitative research, the qualitative research design, and the qualitative research five methods (narrative, phenomenology, grounded theory, ethnography, and case studies).

수학교육집중세미나 INTENSIVE SEMINAR IN MATHEMATICS EDUCATION 3 credit

This course focuses on exploring suggestions for teaching and learning of school mathematics education.

수학교육특강 TOPICS IN MATHEMATICS EDUCATION 3 credit

This course focuses on the various latest theories, such as sociocultural approach of mathematics education, the mathematical language, the mathematics cognitive psychology, the mathematical discourse, and the semiotics.

수학교육평가및측정론 MEASUREMENT AND EVALUATION IN SCHOOL MATHEMATICS 3 credit

This course emphases on the relations between school learning and appropriate types of evaluation. It includes theories of reliability and validity, achievement test construction, and interpretation of test results. Introduction to modern theories of measurement techniques and instruments for cognitive, affective and psycho-motor domain; practical introduction to the techniques of tests, such as construction of tests, scoring, reliability, validity, and item analysis.

수학교재연구론 STUDY OF INSTRUCTIONAL MATERIAL FOR SCHOOL MATHEMATICS 3 credit

This subject mainly deals with the pedagogical content knowledge(PCK) of analyzing the instructional material. This course is to focus on analyzing various contents in mathematics textbook.

수학적문제해결과문제제기론 MATHEMATICAL PROBLEM SOLVING AND PROBLEM POSING 3 credit

This course mainly deals with the philosophical and psychological background of mathematical problem solving.

실험실법수학교육 LABORATORY ACTIVITIES FOR SCHOOL MATHEMATICS 3 credit

This course deals with learning and teaching with CBL, CBR, Probe and Sense, Zonodome, tessellation tile, algebra tile, and geometric three-dimensional tools, We focus on instructional design and impact of laboratory method.

위상수학과수학교육 TOPOLOGY FOR SCHOOL MATHEMATICS 3 credit

This course is intended for students to learn the fundamental concepts of topological spaces from the point of view of mathematics education. We discuss about the countability axioms, separation axioms, Urysohn's lemma, compactness, connectness, product spaces and quotient spaces.

이산수학과수학교육 DISCRETE MATHEMATICS FOR SCHOOL MATHEMATICS 3 credit

This course is intended to grow problem solving ability and to develop the attitude for describing finite or discrete mathematical problems from the point of view of mathematics education. It provides the following topics: permutations and combinations, pigeonhole principle, inclusion-exclusion principle, partitions and basic theory of graphs.

초중등수학영재론 GIFTED EDUCATION OF ELEMENTARY AND SECONDARY MATHEMATICS 3 credit

This course is intended to deal with the theory and practice for the gifted in elementary and middle school. Also, the definition of the gifted in mathematics, diagnostic factors for special abilities, the intelligent general ability of the gifted, the environmental impact, and the development of program for enhancing creativity are dealt.

통계이론과자료분석 STATISTICS AND METHODS OF DATA ANALYSIS 3 credit

This subject deals with the fundamental concepts of basic statistics and modern methods of data analysis from the point of view of mathematics education. It includes distribution of random variable, density function, how to represent data, data relationships bivariate, probability theory and random variables, sampling distribution, validation of the confidence interval, and hypothesis testing. The contents of the data analysis involved in Z-test, t-test, analysis, analysis of variance, regression analysis, factor analysis, discriminant analysis, and correlation analysis, etc.

통계학특강 TOPICS IN STATISTICS 3 credit

During this course, we discuss special topics in statistics : Distribution of random variable, density function, moment generating function, some special distribution, distribution of functions of random variables, distribution of order Statistics, limiting distributions, Estimation, sufficiency statistic, Cramer-Rao lower bound, Bayes Estimation, confidence intervals, hypotheses testing, uniformly most powerful tests, likelihoods ratio test, chisquare tests, nonparametric tests.

학교수학과증명지도법 INSTRUCTIONAL METHODS FOR PROOFS IN SCHOOL MATHEMATICS 3 credit

This subject will discuss the theoretical background for teaching proof in school mathematics. It also deals with the importance of proof in school mathematics, the teaching and learning of proof, the results of the study on education of school geometry, and the analysis of curriculum and textbooks related to proof.

해석학과수학교육 ANALYSIS FOR SCHOOL MATHEMATICS 3 credit

This course is intended for students to learn the fundamental concepts of modern analysis from the point of view of mathematics education. The subject deals with basic concepts of real numbers, continuity, differential, uniform convergence, pointwise convergence and uniform convergence of sequences of functions, metric space. Students will discuss those basic mathematical knowledge and also get the techniques of teaching analysis from this course.

해석학특강 TOPICS IN ANALYSIS 3 credit

During this course, we discuss special topics in analysis such as measure theory, Riemann-Stiletjes integral and Lebesgue integral.