



St. La Salle Institute of Graduate Studies (SIGS)

Master in Teaching Mathematics in Basic Education (MTMBE)

Program Description

This is a non-thesis program that aims to enhance the content knowledge and pedagogical content knowledge of basic education mathematics teachers. Graduates of the program are expected to be able to follow the latest developments in the teaching of basic mathematics from K-10.

To earn the MTMBE degree, the student is required to write a project paper (an action research) and present this in an oral examination.

Objectives:

MTMBE aims to achieve the following:

- 1) equip the students with the necessary knowledge and skills in the design of a curriculum, instruction and assessment of learning mathematics at the elementary and secondary levels (K-10);
- 2) enhance the problem solving, reasoning and meta cognitive skills of teachers;
- 3) develop the ability to prepare pedagogical plans for any mathematics topic at the elementary and secondary levels using problem solving pedagogy and other appropriate strategies;
- 4) develop their ability to do classroom based research on mathematics education;
- 5) equip them with an understanding of how schoolchildren develop mathematical thinking as explained in the contemporary theories of teaching and learning mathematics and make pedagogical decisions based on those theories.

Admission Requirement

MTMBE participants should have a bachelor's degree in education with a grade point average of 2 (B-) or above in the undergraduate field of study or be licensed teachers. They should be nominated by their respective schools according to the following criteria:

- have taught basic mathematics for at least one year
- not more than 50 years old.



Course Requirements and Schedule

Summer 2007:	Use of Technology in Teaching Mathematics	3
	Contemporary Theories on Teaching and Learning Mathematics	3
	Academic Reading and Writing 1	3
SY 2007-2008: Term 1	Academic Reading and Writing 2	3
	Seminar on Problem Solving 1	3
	Seminar on Problem Solving 2	3
Term 2	Teaching of Algebraic Functions 1	3
	Teaching of Algebraic Functions 2	3
	Action Research Methods	3
Term 3	Teaching of Euclidean Geometry	3
	Teaching of Inferential Statistics	3
	History and Philosophy of Mathematics	3
Summer 2008:	Teaching of Calculus	3
	Action Research Writing	3
SY 2008-2009	Oral/Written Comprehensive Examination	39/42

SCX535M - Contemporary Theories on Teaching and Learning Mathematics

This is a three unit course on the contemporary theories on learning mathematics that influence the design of curriculum, instructional strategies and assessment of learning mathematics. It starts with the current issues on the teaching of mathematics at different levels and how these issues were dealt with by the reform movements on mathematics education in different parts of the world. Focus is given to the teaching-learning processes that are constructivistic in nature as advocated by the Cognitively Guided Instruction (CGI), Transformative Learning and Learner Centered Pedagogy by the American Psychological Association. Students learn how to make a pedagogical plan, implement the plan and assess learning.

SCX 713M - Use of Technology in Teaching Mathematics

This course is designed to expose the student to the use of educational technology as a tool for teaching mathematics. This course also intends to familiarize the students with the use of indigenous materials, hand held technology, Computer-Assisted Instruction (CAI), and other information and computer technology and related issues and concerns about their use in mathematics instruction.

SCX620M - Seminar on Problem Solving 1

This is a course on the teaching and assessment of reasoning and problem solving skills at the elementary level. Problem solving pedagogy is used to show how children develop higher order thinking skills at these levels. Principles of the Cognitively Guided Instruction and other reform movements will be employed. Topics include the teaching and assessment of reasoning and problem solving, heuristics of reasoning and problem solving, problem posing, decision making, communicating in mathematics, generalizing patterns and relationships, number sense, measurements, and number theory, a collection of selected strategy games, non-routine problems, problem cards, and game boards.



SCX621M - Seminar on Problem Solving 2

This is a course on the teaching and assessment of reasoning, problem solving and metacognitive skills of students at the secondary level. Problem solving pedagogy is used to develop higher order thinking skills during the adolescence. To accomplish this, the heuristic components that support problem solving is examined including a discussion on comprehensive assessment, observations, metacognitive journals, summary paragraphs, tests and portfolios. Topics include the teaching and assessment of reasoning and problem solving, heuristics of reasoning and problem solving, decision making, communicating in mathematics, generalizing patterns and relationships, a collection of selected non-routine problems, open ended problems requiring an extended response, and problem cards.

SCX541M - Teaching of Algebraic Functions 1

This course focuses on the multiple ways of representing mathematical ideas to develop conceptual understanding of functions. A broad range of teaching styles is used, which includes engaging students in problems involving real data. Topics include functions and change, linear functions, domain and range of a function, inverse function, operations on functions, piecewise defined functions, absolute value function, exponential and logarithmic functions, transformations of functions and their graphs, polynomial and rational functions.

SCX542M - Teaching of Algebraic Functions 2

This course is a continuation of Teaching Algebraic Functions 1. The pedagogical content knowledge built in the first course is enhanced in this second course. It will emphasize depth of understanding rather than breadth of coverage of other transcendental functions. Emphasis will be given to the trigonometric functions and modeling periodic phenomena. Composition of functions, inverses of functions, arithmetic sequences and series, geometric series, and parametric equations are included.

SCX810M - Action Research Methods

This course deals primarily with the current trends in research in mathematics education which are classroom based. It helps the students acquire the skills necessary to design mathematics education research that applies alternative paradigms. These include qualitative research paradigms like ethnography, case studies and phenomenography. It familiarizes the students with the issues on these current trends in school mathematics research. It provides the students an opportunity to write a project paper using either qualitative or quantitative research but preferably those that apply the classroom-based research designs. It requires the students to come up with a proposal for an action research.

SCX630M - Teaching of Euclidean Geometry

This course presents concepts visually, makes students explore ideas analytically, then inductively and deductively to build deep understanding of geometric concepts. Investigative approach is used to help students discover geometric properties and lead them to the formal way of verifying these properties. Contemporary educational research on how geometric thinking develops during adolescence serves as basis for the pedagogy used in this course. Aside from the patty paper geometry, computer technology using geometer sketchpad is also used. Topics include reasoning in geometry, using tools of geometry, discovering and proving triangle properties, polygon properties, circle properties, Pythagorean theorem and solids. Topics on transformations and tessellations are optional.



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SCX640M - Teaching of Inferential Statistics

This is a study on how to teach statistics at the high-school level with emphasis on the interpretation and understanding of concepts rather than computation. It also focuses on the analysis of research-based studies that address how high school students learn and make sense of statistics and how they make connections to other topics in mathematics. It introduces the students to activities that would lead to the development of a framework on how to develop students' conceptual understanding of the major ideas in inferential statistics.

SCX517M - History and Philosophy of Mathematics

This is a study of the history of mathematics with emphasis on studying historical texts and materials to bring students close to the experience of mathematical discovery and to initiate them into the way mathematics is practiced thereby transforming their epistemological concepts of mathematics. It also focuses on the possible ways of integrating history in the teaching of different topics in mathematics enabling the student to understand the connection of mathematics with other disciplines, to see that mathematics has developed, and to comprehend that the same concept can appear in a variety of ways and context. It introduces the students to an array of mathematicians with special focus on a few women mathematicians and their participation in the development of mathematics.

SCX650M - Teaching of Calculus

This course focuses on the development of conceptual understanding of the limits of a function, continuity of a function, derivatives of a function and their application to real life problems. A broad range of teaching styles will be used to model the concepts. Aside from the use of multiple representations, technology will be used to simulate problem situations. Topics on derivatives include derivative and rates of change, basic differentiation rules, derivatives of algebraic functions, derivatives of trigonometric functions and other transcendental functions, implicit differentiation, Newton's methods and applied maximum-minimum problems.

SCX820M - Action Research Writing

This is a three-unit course wherein the students are expected to conduct an action research, write their research results, and make a public presentation of their results. This is in preparation for their written comprehensive examination and oral comprehensive examination.