College of Micronesia-FSM

PO Box 159 Kolonia
Pohnpei, FM 96941

COURSE OUTLINE

Math for Teachers I   Division of Natural Sciences and Mathematics MS/ED 210a
Course Title   Department & Number

Math for Teachers I and II are each one-semester courses. Math for Teachers I,   **Course Description:**
MS/ED 210a is the first semester course. It is designed to provide the students
with a broad understanding of basic mathematic concepts. The topics include: problem solving
strategies, the numeration system and its operations, number theory, integers, fractions, decimals,
exponents, and real numbers.

This course places emphasizes on the use of models, diagrams, manipulatives, applications, problem
solving, and reasoning. Through the use of the hands-on activities in this course, students will gain and
enhance their conceptual knowledge of arithmetic from counting to algebra. These are especially geared
to provide ideas, models, knowledge, and standards that are necessary for successful teaching of
mathematics to elementary and middle school children.

Course Prepared by: Yen-ti Verg-in   **State:** National Campus

	Hours per week		No. of week		Total Hours	Semester Credits
Lecture	3	x	16	x	48	= 3
Laboratory	_____	x	_____	=	_____	= _____
Workshop	_____	x	_____	x	_____	= _____

Purpose of Course: Degree Requirement   _____x_____
                              Degree Elective   _____
                              Certificate   _____
                              Other   _____x_____

Prerequisites: ESL 089 and a grade of "C" or better in MS 098.

_____   _____
Signature, Chairperson, Curriculum Committee   Date Approved by Committee

_____   _____
Signature, President, COM-FSM   Date Approved by President

MS/ED 210 a   Math for Teachers I
Proposal 9/29/04

Course Description:

Math for Teachers I and II are each one-semester courses. Math for Teachers I, MS/ED 210a is the first semester course. It is designed to provide the students with a broad understanding of basic mathematic concepts. The topics include: problem solving strategies, the numeration system and its operations, number theory, integers, fractions, decimals, exponents, and real numbers.

This course places emphasizes on the use of models, diagrams, manipulatives, applications, problem solving, and reasoning. Through the use of the hands-on activities in this course, students will gain and enhance their conceptual knowledge of arithmetic from counting to algebra. These are especially geared to provide ideas, models, knowledge, and standards that are necessary for successful teaching of mathematics to elementary and middle school children.

This course is developed in accordance with "The Pacific Standards for Excellence in Mathematics." It follows the National Councils of Teachers of Mathematics' guidelines closely, and it is designed to fit in with our new certification standards.

The goals for this course are:

- To involve the student in thinking about mathematical ideas.
- To develop the student's ability to convey mathematical thoughts and ideas clearly and concisely to others in both oral and written form.
- To expose the student to mathematical systems and to mathematical problem solving.
- To cultivate in the student an appreciation for mathematics.
- To use problem-solving approaches to investigate and understand mathematical content.
- To familiarize students with the math content of the elementary school curriculum.

I.   **Mathematics/Education Program Outcomes**
Students will be able to:

   A.   **define** arithmetic and algebraic concepts

   B.   **calculate** arithmetic and algebraic *using appropriate technology.*

   C.   **estimate** arithmetic and algebraic solutions

   D.   **solve** arithmetic and algebraic problems *using appropriate technology.*

   E.   **represent** mathematical information numerically, symbolically, graphically, verbally, and visually *using appropriate technology.*

   F.   **develop** mathematical models such as formulas, functions, graphs, and tables *using appropriate technology.*

   G.   **interpret** mathematical models such as formulas, functions, graphs, tables, and schematics, drawing conclusions and making inferences based on those models.

   H.   **explore** mathematical systems *utilizing rich experiences that encourage independent, nontrivial, constructive exploration in mathematics.*

   I.   **communicate** mathematical thoughts and ideas clearly and concisely to others in the oral and written form.

   J.   **demonstrate** a mastery of the content of the elementary school curriculum.

II. **Course Objectives for MS/Ed 210a:**

   A. **General Objectives:**

      1. The students will be able to use different strategies to solve word problems, and reflect and clarify their own thinking about mathematical ideas and situations. (Solve and communicate.)

      2. The students will be able to demonstrate competence in understanding numbers, ways of representing numbers, and

relationship among numbers, the numeration system and its operations. (Define, calculate, estimate, solve, and communicate.)

3. The students will be able to identify what number theory is and utilize it in problem solving situations. (Define, calculate, solve, and communicate.)

4. The students will be able to understand the concept of fractions and decimals, and the interrelationship between them. (Define, calculate, estimate, solve, and communicate.)

B. Specific Student Learning Outcomes:

1. The students will be able to use different strategies to solve word problems, and reflect and clarify their own thinking about mathematical ideas and situations. (Solve and communicate.)

The student will be able to…

1a. apply George Polya's four steps problem solving technique: understand the problem, devise a plan, carry out the plan, and look back and check.

1b. select and apply a variety of strategies to solve multi-step problems as: making a table, chart or list, drawing pictures, making a model, working backwards, guessing and checking, using algebraic expression, and comparing with previous experience.

1c. apply algebraic methods to solve a variety of real-world and mathematical problems.

1d. identify certain patterns either in numbers, symbols, manipulatives, and natural phenomena to solve word problems.

1e. describe, extend, analyze, and create a wide variety of patterns.

1f. select appropriate tools for computation and estimation.

1g   communicate the mathematical thoughts, ideas, and solutions clearly and concisely to others in the oral and written forms.

2. The students will be able to demonstrate competence in understanding numbers, ways of representing numbers, and relationship among numbers, numeration system, and its operations. (Define, calculate, estimate, solve, and communicate.)

The student will be able to…

2a. develop number sense for whole numbers and their four fundamental operations.

2b. model and explain the processes of addition, subtraction, multiplication, and division and describe the relationship between them.

2c. recognize, describe, and use properties of the real number system.

2d. apply mental calculation strategies to compute and make reasonable estimates.

2e. begin to build an understanding of operations with integers by using chip model and number line model to represent positive and negative numbers

3. The students will be able to identify what number theory is and utilize it in problem solving situations. (Define, calculate, solve, and communicate.)

The student will be able to…

3a. understand and use the basic divisibility rules: The divisibility of 2's, 3's, 4's, 5's, 6's, 9's and10's.

3b. define and explain the difference between Least Common Multiples and Greatest Common Factors and find LCM and GCF.

3c. define and identify prime and composite numbers.

3d. develop and apply number theory concepts (e.g. primes and composite, factors and multiples) in real-world and mathematical problem situations.

3e. solve word problems involving LCM or GCF, and explain the solution clearly and concisely to others in the oral and written forms.

4. The student will be able to understand the concept of fractions, decimals, and the interrelationship between them.   (Define, calculate, estimate, solve, and communicate.)

The student will be able to…

4a. define the meaning of fractions and identify, model, and label simple fractions.

4b. describe and define the fractions as the part-to-whole concept, the division concept, and the ratio concept.

4c. compare fractions and decimals efficiently, and find their appropriate location on a number line.

4d. describe and model the relationship of fractions and decimals, and develop and use order relations for whole numbers, fractions, decimals, integers, and rational numbers.

4e. extend their understanding of whole number operations to fractions, decimals, integers, and rational numbers.

4f. solve word problems with fractions and decimals. Explain their solution clearly and concisely to others in the oral and written forms.

III. Pre-requisite: MS 098 or higher with a "C" or better.

IV. Textbook: <u>Mathematics for Elementary Teachers, Volume 1 Numbers and Operations,</u> by Sybilla Beckmann, Copyright © 2003, Person Education, Inc. ISBN 0-321-12980-6

V. Required Course Materials: None

VI. Reference Materials: <u>Mathematics for Elementary School Teachers</u>: Explorations, by Tom Bassarear.

<u>Mathematics for Elementary Teachers</u> by Albert B. Bennett, Jr. and L. Ted Nelson.

VII. Instructional Costs: a variety of inexpensive materials will be needed for the hands-on based activities, and will be provided by the Math/Science and Education Divisions.

VIII. Methods of Instruction: Activities and explorations are used as starting points, followed by discussions or lectures based on extensions of the ideas raised in the investigations.

IX. Evaluation and Assessment: Students will be frequently given both individual and small-groups based assignments and quizzes. Several exams will be spread over the term. A portfolio due at the end of the semester will be required. Scoring rubrics will be used to evaluate the portfolio. All of these methods will be applied to assess student's understanding and competence of the course materials.

X. Credit by Examinations: None.

XI. Attendance Policy: As per College policy in the current catalog.

XII. Academic Honesty Policy: As per College policy in the current catalog.