College of Micronesia-FSM

PO Box 159 Kolonia
Pohnpei, FM 96941

COURSE OUTLINE

Math for Teachers II — Course Title
Division of Natural Sciences and Mathematics MS/ED 210b — Department & Number

Course Description:
Math for Teachers II, MS/ED 210b is the second semester course. It is designed to further the students' understanding of basic mathematic concepts. Besides a three-hour lecture class, an additional six-hour practicum will be integrated into this course. The lecture class will cover the following topics: percent, ratios and proportion, geometry, measurement, basic statistics, and probability. The practicum will include lesson planning, preparation of instructional and assessment activities, and actual teaching. The course is especially geared to provide ideas, models, knowledge, and standards that are necessary for successfully teaching 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	6	x	16	=	96	= 2
Workshop		x		x		=

Purpose of Course:

Degree Requirement	x
Degree Elective	
Certificate	
Other	x

Prerequisites: A grade of "C" or better in MS/ED 210a or a grade of "C" or better in MS 100 College Algebra

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Signature, Chairperson, Curriculum Committee — Date Approved by Committee

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

MS/ED 210 b Math for Teachers II
10/6/2004

Course Description:

Math for Teachers I and II are each one semester course. Math for Teachers II, MS/ED 210b is the second semester course. It is designed to further the students' understanding of basic mathematic concepts. Besides a three-hour lecture class, an additional six-hour practicum will be integrated into this course. The lecture class will cover the following topics: percent, ratios and proportion, geometry, measurement, basic statistics, and probability. The practicum will include lesson planning, preparation of instructional and assessment activities, and actual teaching. The course is especially geared to provide ideas, models, knowledge, and standards that are necessary for successfully teaching mathematics to elementary and middle school children.

Math for Teachers I and II are 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 the oral and written form.
- To involve the student with mathematical systems and with 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.
- To provide models of a variety of teaching strategies used to meet the learning needs of bilingual elementary school students.

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

A. **define** arithmetic, algebraic, geometric, spatial, and statistical concepts.
B. **calculate** arithmetic, algebraic, geometric, spatial, and statistical quantities *using appropriate technology.*
C. **estimate** arithmetic, algebraic, geometric, spatial, and statistical solutions.
D. **solve** arithmetic, algebraic, geometric, spatial, and statistical expressions, equations, functions, and problems *using appropriate technology.*
E. **represent** mathematical information numerically, symbolically, graphically, verbally, and visually *using appropriate technology.*
F. **develop** mathematical and statistical models such as formulas, functions, graphs, tables, and schematics *using appropriate technology.*
G. **interpret** mathematical and statistical 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.

Education Program Outcomes -- Students will be able to:

J. **demonstrate** a mastery of the content of the elementary school mathematics curriculum.
K. **develop** and **demonstrate** elementary school mathematics curriculum in English and the heritage language.
L. **use** a variety of teaching strategies to meet the learning needs of bilingual elementary school students.
M. **assess** and **evaluate** elementary school student learning at both the formative and summative levels.
N. **organize** and **manage** a classroom environment for learning.
O. **demonstrate** and **use** individual and group motivation tools for teaching elementary school mathematics.

II. Course objectives for MS/ED 210b:

A. General Objectives:

1. The students will be able to use different strategies to solve word problems. (Solve, calculate, represent, explore, and communicate)

2. The students will be able to interpret percent, ratios and proportion to understand what they mean, and to demonstrate that there are different valid ways to express concepts. (Define, estimate, solve, and communicate.)

3. The students will be able to show an understanding of the basic concepts of geometry and be able to identify, describe, compare, classify two- and three-dimensional geometric figures and calculate the perimeter, circumference, area, and volume of a given geometric shape. (Define, estimate, solve, and communicate.)

4. The students will extend their understanding of the process of measurement. (Define, calculate, estimate, solve, represent, develop, interpret, explore, and communicate.)

5. The students will use basic probability and statistics in real world situations. (Define, calculate, estimate, solve, represent, develop, interpret, explore, and communicate.)

6. The students will develop lesson plans and prepare instructional and assessment activities that are appropriate for the elementary school children, and delivery these lessons in a regular classroom setting. (Prepare, design, and communicate.)

B. Specific Student Learning Outcomes

6. The students will be able to use different strategies to solve word problems. (Solve, calculate, represent, explore, and communicate.)

The student will be able to …

1a. describe the nature of a problem and the problem-solving process.

1b. select and apply a variety of strategies to solve multi-step problems; including making a table, chart or list, drawing pictures, making a model, using patterns, working backward, guessing and checking, 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 that can be used to solve word problems.

1e. select appropriate tools for computation and estimation.

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

7. The students will be able to interpret decimal, fraction, percent, ratios, and proportion to understand what they mean, and to demonstrate that there are different valid ways to express these concepts. (Define, estimate, solve, and communicate.)

The student will be able to…

2a. work flexibly with fractions, decimals, and percents to solve problems.

2b. demonstrate meaning for percents greater than 100 and less than 1

2c. use percent in a variety of ways and in solving problems.

2d. define ratios, rates, and proportions, their interrelationship, and apply them to solve problems.

2e. apply proportional reasoning to make comparisons.

2f. compare and solve percent change problems, (increase, decrease, and interest.)

8. The students will be able to show an understanding of the basic concepts of geometry and be able to identify, describe, compare, and classify two- and three-dimensional geometric figures. (Define, calculate, estimate, solve, represent, develop, interpret, explore, and communicate.)

   The student will be able to…

   3a. use correct terminology and mathematical notation for figures such as lines, line segments, rays, and angles.

   3b. classify angles according to their measure and according to their relationship to each other.

   3c. identify and describe various models and materials that can be used to explore geometric concepts.

   3d. use a ruler and compass to perform various geometric constructions.

   3e. describe basic concepts and properties of symmetry.

   3f. describe basic concepts and properties of transformational geometry.

   3g. classify polygons according to the number of sides they contain.

   3h. classify triangles according to the measures of their angles and according to the measures of their sides.

   3i. recognize and classify 3 dimensional figures such as prisms, pyramids, cylinders, cones, and spheres.

9. The students will extend their understanding of the process of measurement. (Define, calculate, estimate, solve, represent, develop, interpret, explore, and communicate.)

   The student will be able to…

4a. describe various characteristics and applications of both U.S. customary and metric units of measure.

4b. apply appropriate techniques, tools, and formulas to accurately determine measurements.

4c. explain and define the concepts of perimeter, area, volume, angle measure, capacity, and weight and mass.

4d. develop and use strategies for estimating and determining the perimeters, areas, and volume of regular and irregular shapes.

4e. carry out simple unit conversions, and use unit multiplier(s) to change from U.S. customary system to the metric system.

4f. use proper symbols, terms, and formulas to solve for perimeters, area, and volumes of geometric shapes.

5. The students will use basic probability and statistics in real world situations. (Define, calculate, estimate, solve, represent, develop, interpret, explore, and communicate.)

The student will be able to…

5a. define the terms of range, mean, median, and mode and calculate these for a given collection of data.

5b. collect, organize, describe, and interpret data.

5c. construct a graph (histogram, bar graph, line graph, pictograph, or circle graph) for a given set of data.

5d. apply basic concepts of probability.

5e. predict the probability of outcomes of simple experiments and test the predictions.

5f. construct, read, and interpret basic tables, charts, and graphs.

10. The students will develop lesson plans and prepare instructional and assessment activities that are appropriate for the elementary school children, and delivery these lessons in a regular classroom setting. (Prepare, design, and communicate.)

    The student will be able to…

    6a. write a lesson plan for teaching a lesson involving whole numbers and their operations, decimals, fractions, percents, and some aspect of ratios and proportions.

    6b. prepare lessons that focus on the development of basic and understandable geometric concepts, structures, and terminology.

    6c. prepare lessons that integrate measurement with other topics in mathematics and other subjects in the elementary school curriculum.

    6d. design instructional activities that incorporate basic data gathering, handling, and interpretation in ways appropriate for elementary school children.

    6e. design instructional activities that promote basic algebraic concepts and understanding.

    6f. communicate clearly and concisely to others the fundamental mathematical thoughts, ideas, and solutions in the oral and written forms.

III. Pre-requisite: MS/ED 210a with a "C" or better.

IV. **Textbook:** Today's Mathematics, Part I and II, by James W. Heddens and William R. Speer, Publisher: John Wiley and sons, Inc. (This is for the Spring 2005 only. It is subject to change.)

V. **Required Course Materials:** Basic calculator

VI. **Reference Materials**:

Pacific Standards for Excellence in Mathmatics, Pacific Mathematics and Science Regional Consortium, Pacific Region Educational Laboratory.

Principles and Standards for School Mathematics, National Council of Teachers of Mathematics.

Mathematics for Elementary School Teachers: Explorations, by Tom Bassarear.

Mathematics for Elementary Teachers by Albert B. Bennett, Jr. and L. Ted Nelson.

A Problem Solving Approach to Mathematics for Elementary School Teachers, by Billstein, Libeskind, and Lott.

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 semester will be required. Scoring rubrics will be used to evaluate the portfolio. All 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.