MA150 Mathematics for Elementary School Teachers

Meeting time: Tuesday/Thursday 4:00pm-5:20 pm
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Office hours: By appointment

Catalog course description:
This course is intended for prospective elementary school teachers. The course provides elements of the mathematical content knowledge needed to understand and teach mathematics in elementary school. The course covers problem solving; the development of the numbers systems and operations; fractions, decimals and percent; the use of various manipulatives in teaching elementary mathematics; probability; statistics. It primarily focuses on geometry.

Course Content
This course builds on content taught in MA115, and MA151, however, the main emphasis will be on geometry. There will be an overview of numbers and operations, algebra and statistics so that after the completion of this course, the students will be well prepared for an Elementary Mathematics content licensure exam.

Number and Operations Review:
- Numbers and the decimal system
- Properties of operations and problem solving
- Fractions, decimals, and percents
- Proportional reasoning
- Basic Number theory: Primes, Composites, Tests for Divisibility, Greatest Common Factor, and Least Common Multiple

Algebra Review:
- Expressions, formulas, and equations
- Linear Equations and Inequalities
- Patterns

Geometry and Measurement
- Classification of one-, two-, and three-dimensional figures.
- Perimeter and area
- Surface area and volume
- Coordinate plane
- Measurement: standard and non-standard units
- Connections between algebra and geometry

Statistics and Probability Review
- Basic statistical concepts: measures of central tendency
- Scatter plots
- Probability

For each mathematical topic, the course provides multiple representations and multiple tools for understanding, communicating and making connections within the mathematical content and among various ways of learning it. All through, relevant real life situations will be used to anchor the mathematical concepts and skills.

Course Objectives:
This is a mathematics course designed especially for people who seek to become teachers of mathematics. Teaching mathematics requires a great deal of specialized mathematical knowledge - knowledge that is different from what it takes to do well in a math course as a student yourself or to be good at other jobs that require mathematics. Your own understanding, fluency, and comfort with mathematics will be important to your effectiveness as a teacher. In preparing to teach, you will have to determine the mathematical goals of activities, anticipate the varied ways students might respond, and prepare mathematically for what might happen as a lesson unfolds. You will need to prepare good questions to ask. You will have to generate easier as well as harder versions of problems, either as back-up plans or as ways to focus or extend students' work. When your students have trouble, or get answers wrong, you will need to do more than know that they are confused, or that they have incorrect solutions: You will need to be able to figure out what they are doing mathematically, and whether it makes sense.

In this course, we will work on developing mathematics knowledge that is useful for teaching. The mathematics that we have selected has two major strands, one that is typically thought of as "content" - topics, ideas, procedures in specific mathematical domains, and a second strand that centers more on the particular mathematical thinking, skills, and reasoning involved in the mathematical tasks that teachers do.

We will work on the development of important mathematical practices that are central to teaching. Particular emphasis will be placed on the following mathematical practices:

- *Explanation*: Explanation refers to the forms of expression that justify mathematically and help others understand why a mathematical claim is true. We will explore central features of an adequate mathematical explanation; purposes of explanation; the social nature of explanation (difference between explaining to oneself and explaining to others); providing adequate explanations; listening to and appraising other's explanations.
- *Representation and recording*: Choosing and using representations (verbal, symbolic, visual, material, manipulative, technological); examining correspondences and equivalences among representations; attending to and making sense of representations different from one's own.
- *Understanding and reacting to mathematical thinking that is different from your own*: Making sense of and responding to others people's ideas. As a teacher, you will need to understand, evaluate, and react to your students' explanations and representations. In preparing to do this well, it is important that you get accustomed to thinking in multiple ways and to identifying correspondences among alternative explanations and representations. A good way to start preparing for this kind of work is to pay particular attention to other people's thinking in our class. Can you make sense of it? Is it mathematically valid? How would you respond to it?
- *Talking mathematically*: Communicating your thinking orally in a clear, convincing, and accurate way, and making use of appropriate representations when applicable. Teachers do a lot of talking. The opportunities you will have in this class to practice this skill will not only help you prepare to become a teacher of mathematics, but will also help you learn things better. Being able to express well your mathematical ideas orally is both a prerequisite for, and an indication of, deep understanding.

Grading policy

Homework	20%
Quizzes	30%

Tests	30%
Final Exam	20%

Course delivery method
Teaching methods will include lectures and class discussions.

Course SLOs:	**Math Program Learning Outcomes (PLOs)**	**University Learning Outcomes (ILOs)**	**Method of Assessment**
Understand the mathematical content and procedures underlying elementary mathematics, and how that content relates to higher level mathematics, as well as other disciplines.	MA PR-1, MA PR-6	ILO1, ILO2	**HW, class activities**
Use diagrams, tables, graphs, symbols and words to represent, model and interpret physical, social and mathematical situation.	MA PR-1, MA PR-4	ILO1, ILO2	**Quizzes, Tests**
Solve a variety of problems using multiple problem-solving techniques.	MA PR-1	ILO1, ILO2	**Quizzes, Tests**
Build new mathematical knowledge through problem solving.	MA PR-1	ILO1, ILO2, ILO3, ILO4	**Class activities**
Communicate your own mathematical thinking coherently and clearly in multiple formats.	MA PR-1, MA PR-3	ILO3	**Class activities, Quizzes,Tests**
Analyze and evaluate the mathematical thinking of others.	MA PR-1, MA PR-3, MA PR-6	ILO1	**Class activities**

UOG Expected Student Learning Outcomes (ILOs)
Some of the expected fundamental knowledge, skills, and values that the University of Guam student will have demonstrated upon completion of any degree from this institution are:
ILO1: Mastery of critical thinking & problem solving
ILO2: Mastery of quantitative analysis
ILO3: Effective oral and written communication
ILO4: Understanding & appreciation of culturally diverse people, ideas & values in a democratic context
ILO5: Responsible use of knowledge, natural resources, and technology
ILO6: An appreciation of the arts & sciences
ILO7: An interest in personal development & lifelong learning

Math Program Learning Outcomes (PLOs)
MA PR-1: *demonstrate critical thinking*, *problem solving skills* and ability to use mathematical methods by *identifying, evaluating, classifying, analyzing, synthesizing* data and abstract ideas in various contexts and situations.

MA PR-2: *exhibit a sound conceptual understanding* of the nature of mathematics, and *demonstrate advanced mathematical skills* in mathematical analysis, modern algebra and other mathematical discipline(s).

MA PR-3: *argue and reason* using mathematics, *read, create* and *write down* logically correct mathematical proofs, *use exact mathematical language* and *communicate mathematics efficiently* orally, in writing and using information technology tools.

MA PR-4: *apply abstract thinking, mathematical methods, models* and *current practices* in the sciences, including state-of-the-art mathematical software, to solve problems in theoretical mathematics or in a diverse area of mathematical applications.

MA PR-5: *show maturity in mathematical knowledge and thinking* that prepares and encourages students to pursue graduate studies in mathematics or in related fields.

MA PR-6: *demonstrate an appreciation of* and *enthusiasm for* inquiry, learning and creativity in mathematical sciences, a sense of exploration that enables them to *pursue lifelong learning* and *up-to-date professional expertise* in their careers through various areas of jobs, including governmental, business or industrial jobs in mathematics, related sciences, education or technology.

Academic Integrity Policy

Academic Integrity is about performing in your role as student in ways that are honest, trustworthy, respectful, responsible, and fair (see www.academicintegrity.org for more information). As a student, you will complete your academic assignments in the manner expected by the instructor. Academic dishonesty, including but not limited to cheating and plagiarism may result in suspension or expulsion from the University. Refer to the UOG Student Handbook and Code of Conduct for more information.

Tobacco Policy

The University of Guam is a tobacco-free campus and has a total ban on sales, smoking, distribution and use of tobacco and tobacco-based products on campus. UOG is committed to promoting the health, wellness and social well-being of the University Community, the people of Guam and the Western Pacific.

UOG Disabilities Policy

In accordance with the Americans with Disabilities Act (ADA) of 1990 and the Rehabilitation Act of 1973, the University of Guam does not discriminate against students and applicants on the basis of disability in the administration of its educational and other programs. The University offers reasonable accommodations for a student or applicant who is otherwise qualified, if the accommodation is reasonable, effective and will not alter a fundamental aspect of the University's program nor will otherwise impose an undue hardship on the University, and/or there are not equivalent alternatives. Students are expected to make timely requests for accommodation, using the procedure below.

ADA Accommodation Services

If you are a student with a disability who will require an accommodation(s) to participate in this course, please contact the Student Counseling and Advising Service Accommodations office to discuss your specific accommodation needs confidentially. As your instructor, I will receive notification of your approved accommodation(s) from the SCAS Accommodations Office.

If you are not registered, you should do so immediately at the SCAS Accomodations Office located at the Student Center and EMSS Office, ph/(TTY): 735–3342, to coordinate your accommodation request.

Notification of Rights Under FERPA

The Family Educational Rights and Privacy Act (FERPA) affords students certain rights with respect to their education records. These rights for students, parents and school officials can be viewed at http://www2.ed.gov/policy/gen/guid/fpco/ferpa/index.html.