MATH 2020

Division: Natural Science and Mathematics
Department: Mathematics
Course: MATH 2020
Title: Mathematics for Elementary Teachers II
Catalog Description:

Mathematics for Elementary Teachers II is the second of a two-course series designed to improve the mathematical understanding of prospective elementary teachers. Concepts covered include basic statistics, probability, properties of geometric shapes, measurement using English and Metric systems, geometry using triangle congruence (including constructions), geometry using coordinates, and geometry using transformations. The course will combine a thorough treatment of mathematical concepts with pedagogical philosophy to help prospective teachers learn to teach mathematics with understanding and insight.

General Education Requirements: N/A
Semesters Offered: Spring
Credit/Time Requirement: Credit: 3; Lecture: 3; Lab: 0
Clock/Hour Requirements: 0
Offered for Non-Credit: No
Prerequisites: MATH 1050

Justification:

All elementary education programs require mathematical competency of students prior to student teaching. This course and Math 2010 are aimed at helping students arrive at that competency. This course is required at all the four-year public institutions except the University of Utah. The University of Utah has expanded the course to four credits and given it a 4000 course number.

Student Learning Outcomes:

The student will understand and use the statistical tools needed to describe data and make correct inferences.

The student will understand basic principles of probability and how to use them.

The student will understand English and Metric measurement systems and will be able to perform unit conversions in each.

The student will understand principles and properties of geometric shapes including nomenclature, angles, polygons, and three-dimensional shapes.

The student will understand techniques of problem-solving in geometry and solve many types of problems.

The student will understand principles and properties of geometry based on triangle congruence and how to use them.

The student will understand principles and properties of coordinate geometry and how to use them.

The student will understand principles and properties of geometric transformations and how to use them.

Content:

- Introduction to statistics
- Introduction to probability including simulation, expected value, odds, and conditional probability
- Analyzing geometric shapes, including angles, polygons, and three-dimensional shapes
- Measurement using English and Metric systems including length and area, surface area, and volume
- Geometry using triangle congruence including constructions
- Coordinate geometry
- Geometry using transformations

Students will complete individual assignments, participate in group activities, and take regular examinations. The use of technology including dynamic geometry software (Geometer s Sketchpad) is emphasized.

General Education Outcomes:

1) Read effectively, constructively, and critically.

One of the crucial skills in mathematics is the ability to read carefully and clearly so one understands the problem and can then use appropriate methods to solve it. Emphasis is given on being able to read for meaning.

For example, one problem may state, Find the surface area and volume of a right rectangular prism with dimensions 10 cm by 12 cm by 23 cm. To correctly solve the problem, the student must read carefully to know exactly what shape he/she is dealing with. Also it is important to know there are two responses to the problem: first the surface area and second the volume. Knowing what these terms mean as well as understanding the dimensions are crucial to correctly solving the problem.

6) Apply computational skills to a variety of contexts.

The ability to understand and use mathematical principles is a major component of the course. Algebra skills are a prerequisite to the course and enable the student to perform conversions, use measurements and conversions correctly, and solve geometry problems using triangle congruence, coordinates, and transformations.

For the surface area and volume problem mentioned above the student may use a variety of techniques. To find the surface area, the student may use the fact that the area of a rectangle is length multiplied by the width and then apply this reasoning to the six different faces of the shape. Alternatively, he/she might find the area of the bases, use the perimeter and height of the prism to find the lateral surface area, and then add the two results. To find the volume, the student might find the area of the base and then multiply by the height. The student might also remember and use the formula for calculating the volume of a right prism, namely the product of the

length, width, and height.

Key Performance Indicators:

Student learning will be evaluated through daily assignments and periodic examinations. Understanding will also be evaluated by observation of students as they demonstrate their reasoning to the class and as they participate in group activities.

The point breakdown for computing the final grade will be:

Exams (midterms and final):	50-70%
Homework:	10-25%
Classroom Participation:	0-10%
Other activities:	0-15%

Representative Text and/or Supplies:

Musser, Burger, and Peterson, *Mathematics for Elementary Teachers: A Contemporary Approach*, current edition, John Wiley & Sons, Inc.

Billstein, Libeskind, and Lott, *A Problem Solving Approach to Mathematics for Elementary School Teachers*, current edition, Addison Wesley.

Optimum Class Size: 24
Maximum Class Size: 32

Signatures:

I hereby submit this course syllabus:

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Kari Arnoldsen, PhD, Professor

I hereby find this course consistent with the goals and resources of the Mathematics Department:

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Kari Arnoldsen, PhD, Professor, Chair

I hereby find this course consistent with the goals and resources of the Natural Science and Mathematics Division:

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Dan Black, EdD, Associate Professor, Dean

I have discussed the need for library resources related to this class with the person submitting the syllabus:

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Lynn Anderson, MLIS, Technical Services Librarian (Main Campus)

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Michelle Olsen, MLS, Campus Librarian (Richfield Campus)