

Principles of Mathematics II

Course Design

2000-2001

Course Information

Organization:	Eastern Arizona College
Division:	Mathematics
Course Number:	MAT 135
Title:	Principles of Mathematics II
Credits:	3
Developed by:	Ralph Selensky
Lecture/Lab Ratio:	3 lecture; 0 lab
Transfer Status:	ASU general elective, U of A departmental elective, NAU MAT 155
Extended Registration	
Class:	No
CIP Code:	27.0101
Assessment Mode:	Pre/Post Test (20 questions/20 points)
Awareness Course:	No
Intensive Writing	
Course:	No
Prerequisites:	1. MAT 130 with a grade of "C" or better
Educational Value:	To provide students with a better understanding of the fundamental concepts of mathematics generally taught in an elementary school. To expose students to a variety of mathematical ideas and methods for teaching elementary math.
Description:	Mathematic principles and processes underlying current and evolving programs of mathematics instruction in elementary schools, grades K-8; real numbers, geometry and measurement, statistics and probability.
Textbooks:	Thomas Sonnabend. <i>Mathematics for Elementary School Teachers..</i> second edition. Saunders College Publishing, 1997.
Supplies:	Compass, straight edge and a scientific calculator

Competencies and Performance Standards

1. Understand the geometry of two and three dimensional figures.			
<i>Domain-- Cognitive</i>	<i>Level-- Application</i>	<i>Importance-- Important</i>	<i>Difficulty-- Medium</i>
<p>Criteria--Criteria - Performance will be satisfactory when:</p> <ul style="list-style-type: none"> • learner can explain the mathematical concept of a point, a line, a ray, an angle, and a plane. • learner understands angle measure. • learner can define, identify, and classify a wide variety of plane figures. • learner investigates angle measure in polygons. • learner can explain the possible relationships between lines, and planes in space. • learner can define, identify, and classify a wide variety of three dimensional figures. • learner investigates Euler's formula for polyhedra. • learner can visualize and sketch three dimensional figures. 	<p>Conditions-- Competence will be demonstrated:</p> <ul style="list-style-type: none"> • on assigned activities. • on written exams. • on a two hour cumulative exam. 	<p>Learning Objectives:</p> <ol style="list-style-type: none"> Explain the mathematical concept of a point, a line, a ray, an angle, and a plane. Understand angle measure. Define, identify, and classify a wide variety of plane figures. Investigate angle measure in polygons. Explain the possible relationships between lines, and planes in space. Define, identify, and classify a wide variety of three dimensional figures. Investigate Euler's formula for polyhedra. Visualize and sketch three dimensional figures. 	
2. Perform rigid motions and geometric constructions.			
<i>Domain-- Cognitive</i>	<i>Level-- Application</i>	<i>Importance-- Important</i>	<i>Difficulty-- High</i>
<p>Criteria--Criteria - Performance will be satisfactory when:</p> <ul style="list-style-type: none"> • learner can define congruence. • learner can perform translations, rotations, and reflections of a given geometric figure. • learner can perform a variety of geometric constructions. • learner can discuss symmetry and similarity. 	<p>Conditions-- Competence will be demonstrated:</p> <ul style="list-style-type: none"> • on assigned activities. • on written exams. • on a two hour cumulative exam. 	<p>Learning Objectives:</p> <ol style="list-style-type: none"> Define congruence. Perform translations, rotations, and reflections of a given geometric figure. Perform a variety of geometric constructions. Discuss symmetry and similarity. 	

3. Calculate perimeter, area, surface area, and volume.			
<i>Domain-- Cognitive</i>	<i>Level-- Application</i>	<i>Importance-- Important</i>	<i>Difficulty-- Medium</i>
<p>Criteria--Criteria - Performance will be satisfactory when:</p> <ul style="list-style-type: none"> • learner understands the English and Metric systems of measurement. • learner can calculate the perimeter and area of a variety of plane geometric figures. • learner can apply the pythagorean theorem. • learner can calculate the surface area and volume of a variety of three dimensional geometric figures. • learner understands and can apply the relationships between length, surface area, and volume of similar figures. 	<p>Conditions-- Competence will be demonstrated:</p> <ul style="list-style-type: none"> • on assigned activities. • on written exams. • on a two hour cumulative exam. 	<p>Learning Objectives:</p> <ol style="list-style-type: none"> Understand the English and Metric systems of measurement. Calculate the perimeter and area of a variety of plane geometric figures. Apply the pythagorean theorem. Calculate the surface area and volume of a variety of three dimensional geometric figures. Understand and apply the relationships between length, surface area, and volume of similar figures. 	
4. Understand relations, functions, and coordinate geometry.			
<i>Domain-- Cognitive</i>	<i>Level-- Application</i>	<i>Importance-- Important</i>	<i>Difficulty-- Medium</i>
<p>Criteria--Criteria - Performance will be satisfactory when:</p> <ul style="list-style-type: none"> • learner can distinguish between relations and functions. • learner can determine the domain and the range of relations and functions. • learner can identify equations and graphs as lines or parabolas. • learner can determine the slope of a line. • learner can sketch the graph of a line and a parabola. • learner can translate back and forth between words, algebra, tables and graphs. • learner can solve problems using formulas, tables, and graphs. • learner uses coordinate geometry to solve geometry problems. 	<p>Conditions-- Competence will be demonstrated:</p> <ul style="list-style-type: none"> • on assigned activities. • on written exams. • on a two hour cumulative exam. 	<p>Learning Objectives:</p> <ol style="list-style-type: none"> Distinguish between relations and functions. Determine the domain and the range of relations and functions. Identify equations and graphs as lines or parabolas. Determine the slope of a line. Sketch the graph of a line and a parabola. Translate back and forth between words, algebra, tables and graphs. Solve problems using formulas, tables, and graphs. Use coordinate geometry to solve geometry problems. 	

5. Collecting, organizing, and analyzing data.			
<i>Domain-- Cognitive</i>	<i>Level-- Application</i>	<i>Importance-- Important</i>	<i>Difficulty-- Medium</i>
<p>Criteria--Performance will be satisfactory when:</p> <ul style="list-style-type: none"> • learner can construct and interpret a variety of statistical graphs and tables. • learner can explain common statistical deceptions. • learner can calculate the mean, median, and mode of a data set, and discuss the similarities and difference between these measures. • learner can calculate the standard deviation of a data set and explain what it measures. • learner can explain the characteristics of a normal distribution. • learner can discuss sampling techniques and their importance to statistical studies. • learner can explain the information typically found on standardized test reports. 	<p>Conditions-- Competence will be demonstrated:</p> <ul style="list-style-type: none"> • on assigned activities. • on written exams. • on a two hour cumulative exam. 	<p>Learning Objectives:</p> <ol style="list-style-type: none"> Construct and interpret a variety of statistical graphs and tables. Explain common statistical deceptions. Calculate the mean, median, and mode of a data set, and discuss the similarities and difference between these measures. Calculate the standard deviation of a data set and explain what it measures. Explain the characteristics of a normal distribution. Discuss sampling techniques and their importance to statistical studies. Explain the information typically found on standardized test reports. 	
6. Understand probability.			
<i>Domain-- Cognitive</i>	<i>Level-- Application</i>	<i>Importance-- Important</i>	<i>Difficulty-- High</i>
<p>Criteria--Criteria - Performance will be satisfactory when:</p> <ul style="list-style-type: none"> • learner can discuss experimental and theoretical probabilities. • learner understands the concept of probability. • learner can define complementary, mutually exclusive, independent, and dependent events. • learner can calculate the probabilities of simple and combined events. • learner can use the formulas for permutations and combinations to solve counting problems. • learner can calculate the expected value of a game and determine if the game is fair. 	<p>Conditions-- Competence will be demonstrated:</p> <ul style="list-style-type: none"> • on assigned activities. • on written exams. • on a two hour cumulative exam. 	<p>Learning Objectives:</p> <ol style="list-style-type: none"> Discuss experimental and theoretical probabilities. Understand the concept of probability. Define complementary, mutually exclusive, independent, and dependent events. Calculate the probabilities of simple and combined events. Use the formulas for permutations and combinations to solve counting problems. Calculate the expected value of a game and determine if the game is fair. 	

Types of Instruction

Classroom Presentation

Grading Policy

Evaluation Methods:

Each instructor has the flexibility to develop evaluative procedures within the following parameters.

1. Written exams must represent at least 50% of the course grade.
2. Final exam must represent at least 20% of the course grade.
3. The Post Test is to be embedded in the final exam and must represent at least 10% of the course grade.
4. Other activities may represent at most 30% of the course grade.

Grading Scale:

Grade	Requirement
A	90% - 100%
B	80% - 89%
C	70% - 79%
D	60% - 69%
F	Below 60%

Learning Plans

Learning Plan 1-- Principles of Mathematics II

Overview: Instructors are encouraged to be creative and to use both a variety of learning activities, and a variety of assesment activities. Suggested activities are listed below.

- Competency:** 1. **Understand the geometry of two and three dimensional figures.**
- Competency:** 2. **Perform rigid motions and geometric constructions.**
- Competency:** 3. **Calculate perimeter, area, surface area, and volume.**
- Competency:** 4. **Understand relations, functions, and coordinate geometry.**
- Competency:** 5. **Collecting, organizing, and analyzing data.**
- Competency:** 6. **Understand probability.**

Learning Activities:

- _____ 1. listen to a lecture
- _____ 2. participate in a class discussion
- _____ 3. read the assigned section in the text
- _____ 4. demonstrate a procedure for others
- _____ 5. work on assigned problems individually
- _____ 6. collaborate with others on assigned problems
- _____ 7. correct mistakes on homework and exam
- _____ 8. complete a computer lab activity

Performance

Assessment Activities:

- _____ 1. complete assigned activities
- _____ 2. complete written exam
- _____ 3. complete a final exam