EASTERN ARIZONA COLLEGE
Principles of Mathematics II
Course Design
2018-2019

Course Information

Division Mathematics
Course Number MAT 157
Title Principles of Mathematics II
Credits 3
Developed by Ray Orr
Lecture/Lab Ratio 3 Lecture/0 Lab
Transfer Status

<table>
<thead>
<tr>
<th>ASU</th>
<th>NAU</th>
<th>UA</th>
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<td>MTE 281</td>
<td>MAT 155; Foundation Requirement [FNRQ]</td>
<td>MATH Dept Elective</td>
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Activity Course No
CIP Code 27.0101
Assessment Mode Final Exam (25 Questions/100 Points)
Semester Taught Spring
GE Category None
Separate Lab No
Awareness Course No
Intensive Writing Course No

Prerequisites
MAT 140 or higher with a grade of "C" or higher or placement test score as established by District policy

Description
A continuation of MAT 156, Principles of Math I, including the processes underlying mathematics instruction in grades K-8; algebra, measurement, geometry including perimeter, area, volume, surface area, transformations, constructions, symmetry, scaling, statistics, and probability.

Supplies
Calculator
1. **Explain algebra.**

   **Learning objectives**
   
   *What you will learn as you master the competency:*
   
   a. Classify expressions as either numerical or algebraic.
   b. Define a variable in the context of a problem.
   c. Evaluate algebraic expressions.
   d. Explain the process of solving an equation.
   e. Solve problems using algebraic thinking.
   f. Determine the number of solutions an equation has as: infinite, none, or finite.
   g. Classify a sequence as arithmetic, geometric, or neither.
   h. Determine a formula for the general term for both arithmetic and geometric sequences.
   i. Graph linear functions.
   j. Explain the slope as a rate of change.
   k. Solve problems numerically, graphically, and analytically.

   **Performance Standards**
   
   *You will demonstrate your competence:*
   
   - on assigned activities
   - on written exams
   - on a two hour cumulative exam

   *Your performance will be successful when:*
   
   - learner can classify expressions as either numerical or algebraic
   - learner can define a variable in the context of a problem
   - learner can evaluate algebraic expressions
   - learner can explain the process to solve an equation
   - learner can solve problems using algebraic thinking
   - learner can determine the number of solutions as: infinite, none, or finite
   - learner can identify sequences as arithmetic, geometric, or neither
   - learner can find the general term of arithmetic and geometric sequences
   - learner can graph linear functions
   - learner can explain slope as a rate of change
   - learner can solve problems numerically, graphically, and analytically

2. **Explain basic geometry ideas.**

   **Learning objectives**
   
   *What you will learn as you master the competency:*
   
   a. Explain the concept of a point, line, ray, an angle, and a plane.
   b. Classify angles as acute, right, obtuse, or straight.
   c. Use degrees to measure angles.
   d. Find the compliment and supplement of an angle.
   e. Discuss angles produced by configurations of lines.
f. Explain the difference between parallel, skew, and perpendicular lines.
g. Define, identify, and classify polygons.
h. Classify quadrilaterals in a hierarchy based on their properties.
i. Identify the parts of a circle (center, radius, diameter, and circumference).

Performance Standards
You will demonstrate your competence:
io on assigned activities
io on written exams
io on a two hour cumulative exam

Your performance will be successful when:
io learner can explain the concept of a point, a line, a ray, an angle, and a plane
io learner can use degree angle measure
io learner defines, identifies, and classifies angles as acute, right, obtuse, or straight
io learner can find the compliment and supplement of an angle
io learner can discuss angles produced by configurations of lines
io learner can explain the difference between parallel, skew, and perpendicular lines
io learner can define, identify, and classify polygons
io learner can classify quadrilaterals in a hierarchy based on their properties
io learner can identify the parts of a circle

3. Explain measurement.

Learning objectives
What you will learn as you master the competency:
a. Use the U.S. customary system of measure.
b. Use the Metric system of measure.
c. Select an appropriate unit for a measurement in both systems.
d. Use the correct units for length, area, and volume.
e. Compute unit conversions within the U.S. customary system.
f. Compute unit conversions within the Metric system.
g. Compute unit conversions between the two systems of measurement.
h. Explain why some error is involved in all measurements.

Performance Standards
You will demonstrate your competence:
io on assigned activities
io on written exams
io on a two hour cumulative exam

Your performance will be successful when:
io learner can select an appropriate unit for a measurement in both systems
io learner can use the U.S. customary system of measure
io learner can use the Metric system of measure
io learner can use correct units for length, area, and volume
4. Explain perimeter and area of shapes.

Learning objectives
What you will learn as you master the competency:

a. Explain and use the moving and additivity principles.
b. Use the formula for the area of a rectangle to explain the area formulas of other shapes.
c. Define pi.
d. Explain why the area formula for circles is valid.
e. Explain why shearing a shape does not change its area.
f. Estimate the area of irregular shapes.
g. Solve problems using the Pythagorean Theorem.

Performance Standards
You will demonstrate your competence:

- on assigned activities
- on written exams
- on a two hour cumulative exam

Your performance will be successful when:

- learner can explain and use the moving and additivity principles
- learner can use the formula for the area of a rectangle to explain other area formulas
- learner can define pi
- learner can explain why the formula for the area of a circle is valid
- learner can explain why shearing a shape does not change its area
- learner can approximate the area of irregular shapes
- learner can use the Pythagorean Theorem

5. Explain the geometry of solid shapes and their volume and surface area.

Learning objectives
What you will learn as you master the competency:

a. Determine the number of faces, edges, and vertices of a solid.
b. Classify solids as prisms, cylinders, cones, or pyramids.
c. Create the pattern or net of a solid.
d. Create the solid given the pattern or net.
e. Calculate the volume of prisms, cylinders, cones, and pyramids.
f. Calculate the surface area of prisms, cylinders, cones, and pyramids.
g. Calculate the volume and surface area of spheres.
h. Explain the volume of submersed objects versus the weight of floating objects.
**Performance Standards**

You will demonstrate your competence:

- on assigned activities
- on written exams
- on a two hour cumulative exam

Your performance will be successful when:

- learner can determine the number of faces, edges, and vertices of a solid
- learner can classify solids as prisms, cylinders, cones, or pyramids
- learner can create the pattern or net of a solid
- learner can create the solid given the pattern or net
- learner can calculate the volume of prisms, cylinders, cones, and pyramids
- learner can calculate the surface area of prisms, cylinders, cones, and pyramids
- learner can calculate the volume and surface area of spheres
- learner can explain the volume of submersed objects verses the weight of floating objects

6. **Explain geometric constructions, motion, and change.**

**Learning objectives**

What you will learn as you master the competency:

a. Explain the transformation of reflection and its properties.
b. Explain the transformation of translation and its properties.
c. Explain the transformation of rotation and its properties.
d. Explain different types of symmetry.
e. Explain scaling in terms of length, area, and volume.
f. Explain similar shapes.
g. Use similarity to solve problems.
h. Demonstrate geometric constructions with a compass and straight edge.

**Performance Standards**

You will demonstrate your competence:

- on assigned activities
- on written exams
- on a two hour cumulative exam

Your performance will be successful when:

- learner can explain the transformation of reflection and its properties
- learner can explain the transformation of translation and its properties
- learner can explain the transformation of rotation and its properties
- learner can explain different types of symmetry
- learner can explain scaling in terms of length, area, and volume
- learner can explain similar shapes
- learner can use similarity to solve problems
- learner can demonstrate geometric constructions with a compass and straight edge
7. Explain organizing and analyzing data.

**Learning objectives**

*What you will learn as you master the competency:*

a. Construct and interpret a variety of statistical graphs and tables.
b. Calculate the mean, median, and mode of a data set.
c. Calculate the range and standard deviation of a data set and explain what it measures.
d. Calculate the quartiles of a data set.
e. Explain the characteristics of a normal distribution.

**Performance Standards**

*You will demonstrate your competence:*

- on assigned activities
- on written exams
- on a two hour cumulative exam

*Your performance will be successful when:*

- 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
- learner can calculate the range and standard deviation of a data set
- learner can explain the characteristics of a normal distribution

8. Explain probability.

**Learning objectives**

*What you will learn as you master the competency:*

a. Explain experimental and theoretical probabilities.
b. Explain basic probability.
c. Explain complementary, independent, and dependent events.
d. Calculate the probabilities of simple events.

**Performance Standards**

*You will demonstrate your competence:*

- on assigned activities
- on written exams
- on a two hour cumulative exam

*Your performance will be successful when:*

- learner can explain experimental and theoretical probabilities
- learner can explain basic probability
- learner explain complementary, independent, and dependent events
- learner can calculate the probabilities of simple events
Types of Instruction
Classroom Presentation

Grading Information

Grading Rationale
Each instructor has the flexibility to develop evaluative procedures within the following parameters.
1. Written exams must represent at least 60% of the final course grade.
2. Final exam must represent at least 20% of the final course grade.
3. Other activities may represent at most 20% of the final course grade.

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