EASTERN ARIZONA COLLEGE

Principles of Mathematics II

Course Design
2014-2015

Course Information
Division: Mathematics
Course Number: MAT 157
Title: Principles of Mathematics II
Credits: 3
Developed by: Jay Clarke
Lecture/Lab Ratio: 3 Lecture/0 Lab
Transfer Status:

<table>
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<tr>
<th>ASU</th>
<th>NAU</th>
<th>UA</th>
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<tr>
<td>MTE 181</td>
<td>MAT 155 also satisfies: Foundation Requirement [FNRQ]</td>
<td>MATH Departmental Elective</td>
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Activity Course: No
CIP Code: 27.0101
Assessment Mode: Pre/Post Test (25 Questions/100 Points)
Semester Taught: Fall and 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
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.

Supplies
Compass, Straight edge, and a Scientific calculator
Competencies and Performance Standards

1. Understand the geometry of two and three dimensional figures.

   **Learning objectives**
   
   What you will learn as you master the competency:
   
   a. Explain the mathematical concept of a point, a line, a ray, an angle, and a plane
   b. Understand angle measure
   c. Define, identify, and classify a wide variety of plane figures
   d. Investigate angle measure in polygons
   e. Explain the possible relationship between lines, and planes in space
   f. Define, identify, and classify a wide variety of three dimensional figures
   g. Investigate Euler's formula for polyhedral
   h. Visualize and sketch three dimensional figures

   **Performance Standards**

   You will demonstrate your competence:
   
   o On assigned activities
   o On written exams
   o On a two hour cumulative exam

   Your performance will be successful when:
   
   o You can explain the mathematical concept of a point, a line, a ray, an angle, and a plane
   o You understand angle measure
   o You define, identify, and classify a wide variety of plane figures
   o You can investigate angle measure in polygons
   o You can explain the possible relationships between lines, and planes in space
   o You can define, identify, and classify a wide variety of three dimensional figures
   o You can investigate Euler's formula for polyhedral
   o You can visualize and sketch three dimensional figures

2. Perform rigid motions and geometric constructions.

   **Learning objectives**

   What you will learn as you master the competency:
   
   a. Define congruence
   b. Perform translation, rotations, and reflections of a given geometric figure
   c. Perform a variety of geometric constructions
   d. Discuss symmetry and similarity

   **Performance Standards**

   You will demonstrate your competence:
   
   o On assigned activities
   o On written exams
   o On a two hour cumulative exam

   Your performance will be successful when:
   
   o You can define congruence
3. Calculate perimeter, area, surface area, and volume.

Learning objectives

What you will learn as you master the competency:

a. Understand the English and Metric systems of measurement
b. Calculate the perimeter and area of a variety of plane geometric figures
c. Apply the Pythagorean theorem
d. Calculate the surface area and volume of a variety of three dimensional geometric figures
e. Understand and apply the relationship between length, surface area, and volume of similar figures

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:

- You can understand the English and Metric systems of measurement
- You can calculate the perimeter and area of a variety of plane geometric figures
- You can apply the Pythagorean theorem
- You can calculate the surface area and volume of a variety of three dimensional geometric figures.
- You understand and can apply the relationship between length, surface area, and volume of similar figures

4. Understand relations, functions, and coordinate geometry.

Learning objectives

What you will learn as you master the competency:

a. Distinguish between relations and functions
b. Determine the domain and the range of relations and functions
c. Identify equations and graphs as lines or parabolas.
d. Determine the slope of a line
e. Sketch the graph of a line and a parabola
f. Translate back and forth between words, algebra, tables and graphs
g. Solve problems using formulas, tables, and graphs
h. Use coordinate geometry to solve geometry problems

Performance Standards

You will demonstrate your competence:

- On assigned activities
5. Collecting, 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. Understand the concept of probability
c. Calculate the mean, median, and mode of a data set, and discuss the similarities and difference between these measures
d. Calculate the standard deviation of a data set and explain what it measures
e. Explain the characteristics of a normal distribution
f. Discuss sampling techniques and their importance to statistical studies
g. Explain the information typically found on standardized test reports

**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:*

- You can construct and interpret a variety of statistical graphs and tables
- You can explain common statistical deceptions
- You can calculate the mean, median, and mode of a data set, and discuss the similarities and difference between these measures
- You can calculate the standard deviation of a data set and explain what it measures
- You can explain the characteristics of a normal distribution
- You can discuss sampling techniques and their importance to statistical studies
- You can explain the information typically found on standardized test reports
6. **Understand probability.**

**Learning objectives**

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

a. Discuss experimental and theoretical probabilities
b. Understand the concept of probability
c. Define complementary, mutually exclusive, independent, and dependent events
d. Calculate the probabilities of simple and combined events
e. Use the formulas for permutations and combinations to solve counting problems
f. Calculate the expected value of a game and determine if the game is fair

**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:*

- You can discuss experimental and theoretical probabilities
- You understand the concept of probability
- You define complementary, mutually exclusive, independent, and dependent events
- You can calculate the probabilities of simple and combined events
- You can use the formulas for permutations and combinations to solve counting problems
- You can calculate the expected value of a game and determine if the game is fair

**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. The Post Test is to be embedded in the final exam and must represent at least 10% of the final course grade.
4. 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%