

MASTER SYLLABUS

MARSHALL UNIVERSITY GRADUATE COLLEGE
SOUTH CHARLESTON, WEST VIRGINIA 25303
746-2500 OR 1-800-642-9842

COURSE: CIME 558 Geometry for Math Educators

CREDIT HOURS: 3

PREREQUISITES: CIME 557 Precalculus for Math Educators or equivalent

RATIONALE: Geometric concepts are used throughout the target curriculum. Teachers of mathematics through Algebra I are expected to introduce and apply these concepts in a manner that is consistent with the formal application students will be expected to use in subsequent classes.

GOALS: To prepare the educator to effectively use geometric principles in the teaching of mathematics through the level of Algebra I.

OBJECTIVES:

Content Knowledge:**Conceptual Knowledge Through Discovery and Exploration:**

1. Distinguish between direct and indirect proof.
2. Distinguish among trigonometric ratios.
3. Apply trigonometric ratios.
4. Interpret graphs of sine and cosine in relation to amplitude, period, and phase changes.

Mastery Knowledge Through Application:

5. Identify the relationships of points, lines, planes, angles, rays, or segments.
6. Show relationships between points, lines, and planes.
7. Use concept of betweenness.
8. Solve problems that involve measurement in both the metric and traditional systems.
9. Compute perimeter and area of triangles, quadrilaterals, circles, and regions that are combinations of these
10. Compute the surface area and volume of right prisms, cones, cylinders, spheres, and solids that are combinations of these.
11. Apply the Pythagoren theorem to solve problems.
12. Solve problems involving special triangles, such as isosceles and equilateral.
13. Use relationships such as congruency and similarity to solve problems involving two-dimensional and three-dimensional figures.
14. Relate proportions to similar triangles.
15. Solve problems involving parallel and perpendicular lines.
16. Solve problems using the relationships among the parts of triangles, such as sides, angles, medians, midpoints, and altitudes.
17. Solve problems using the properties of special quadrilaterals, such as the square,

- rectangle, parallelogram, rhombus, and trapezoid.
18. Describe relationships among sets of special quadrilaterals.
 19. Solve problems involving angles, diagonals, vertices of polygons with more than four sides.
 20. Solve problems involving angles, arcs, chords, secants, and tangents of circles.
 21. Solve problems involving reflections, rotations, and translations of points, lines or polygons in the plane [flips, turns and slides].
 22. Examine the congruence, similarity, and line or rotational symmetry of objects using transformations.
 23. Execute geometric constructions using straight-edge and compass and Geometer's Sketchpad to create geometric objects with specified properties such as bisector, perpendicular bisector, and congruent segment.
 24. Prove that a given geometric construction yields the desired result.
 25. Solve problems that can be represented on the xy -plane such as finding the distance between points or the coordinates of the midpoint of a line segment.
 26. Use coordinate geometry to represent and examine the properties of geometric shapes.
 27. Use coordinate geometry to examine special geometric shapes such as regular polygons and those with parallel or perpendicular sides.
 28. Provide and interpret geometric representations of numeric and algebraic concepts.
 29. Distinguish between inductive and deductive reasoning.
 30. Create and critique inductive and deductive arguments concerning geometric ideas and relationships such as congruence, similarity, and the Pythagorean relationship.
 31. Use two-dimensional representations of three-dimensional objects to visualize and solve problems such as surface area and volume.
 32. Use visual tools such as networks to represent and solve problems
 33. Use geometric models to represent and explain numerical and algebraic relationships.
 34. Recognize and apply geometric ideas and relationships in area outside the mathematics classroom such as art, science, and marketing.
 35. Identify and restate conditional, converse, inverse, and contrapositive statements.
 36. Identify the components of a mathematical system, such as a group.
 37. Complete the steps for a formal proof.

Pedagogical Knowledge:

1. Evaluate the validity of given mathematical and conjectures.
2. Describe the role of mathematics in other academic disciplines and in everyday life.
3. Identify the most appropriate problem-solving strategy to use in a given situation.
4. Identify the most appropriate computation method to use in a given situation.
5. Evaluate the use of calculators or computers in problem-solving situations.
6. Evaluate the reasonableness of solutions to given problems.
7. Select the most appropriate manipulatives for a given problem-solving situation.
8. Analyze procedures for collecting, organizing, and recording data as part of a problem-solving process.
9. Identify mathematical questions that must be answered in a given problem-solving situation.
10. Identify equivalent representations of mathematical information or a mathematical concept.
11. Apply mathematical terms, symbols, concepts, or principles to describe real world situations.
12. Analyze mathematical ideas and relationships.

CONTENT
MAJOR TOPICS:

- logical proofs
- angle relations
- parallel and perpendicular lines
- circles
- triangles
- polygons
- solids
- elementary trigonometry