34002 Fundamental Concepts of Geometry (3)

Knowledge

To develop the mathematical knowledge for teaching geometry at the middle school and high school levels. This course will focus on the ideas of Euclidean geometry and how these ideas are related to each other. Students will be able to explain how formulas for areas and volume were developed and be able to present justifications and proofs for important geometrical ideas.

Comprehension

Students will implement the Mathematical Standards of Practice as they work to solve geometry problems. They will use multiple ways to explain why the Pythagorean Theorem is valid and apply the converse of the Pythagorean Theorem.

Application

Students will use dynamic geometry software (Geometer's Sketchpad) to justify and solve problems focusing on characteristics that are invariant and those characteristics that vary. They will generate conjectures and then justify, prove, or disprove these conjectures.

Analysis

Students will use derive formulas for perimeter and area of polygons as well as surface area and volume of polyhedral. They will appraise their current understanding of geometry and identify prior misconceptions. They will listen to each other's explanations and try to make sense of them. They will examine dilations, translations, rotations, and reflections and how these can be implemented to determine congruence and similarity

Synthesis

Students will use construction techniques with compass and straightedge, algebraic reasoning with slopes and distances, and geometric reasoning to synthesize characteristics of geometric shapes. They will use dynamic geometry software to connect ideas within geometry and between other areas of mathematics.

Evaluation

Students will compare justifications and proofs of geometry problems and evaluate various solution methods to find an efficient approach. Students will discuss distinctions between informal demonstrations and a proof and determine ways that the informal demonstration can suggest steps in a proof. Students will evaluate the role that the parallel postulate plays in major theorems.

Class Activities

Students will work in cooperative groups to discuss geometry problems and then present findings to the class for critique. They will discuss conjectures based on explorations and then endeavor to determine the validity of these conjectures.

Out of class Activities

Students will have homework assignments that allow them to show their understanding of the concepts discussed in class and in the book. These assignments will be collected periodically and the instructor will randomly check problems to determine if sufficient understanding is demonstrated. Students will

also be expected to present homework problems to the class to hone their skills in explaining and vocabulary usage.