MA 341 **MODERN GEOMETRY** **Fall 2009**

Instructor: Dr. Bobette Thorsen, 384F Esbenshade Hall, Office Phone: 361-1338

Office Hours: M: 2:00-4:30, W: 2:00-4:30, F: 2:00-3:00 or by appointment.

Textbook: *Roads to Geometry* (Third Edition) by Edward Wallace and Stephen West

Prerequisites: MA 235: Discrete Mathematics with proofs

Objectives: To develop a thorough understanding of the concepts in Euclidean Geometry that are generally taught in high school geometry classes.
To learn about Finite Geometries, Incidence Geometries, and topics in Non-Euclidean Geometry.
To provide solid training in mathematical thinking and writing, especially with regard to mathematical proofs.
To learn how to use the software Geograba and Geometer's Sketchpad
To gain an appreciation for the rich history of Geometry.

Attendance: Regular attendance is expected**.** Excessive amounts of absenteeism may result in a lower grade.

Homework: Homework related to the lecture topics will be assigned every Thursday and collected at the beginning of class the following week. Homework will be graded. You are encouraged to discuss the homework problems with others in the class, however you must write your solutions independently. To receive full credit on a problem your solution needs to be complete, accurate, clearly written and easy to follow. The lowest homework grade will be dropped.

Labs: There will be several computer assignments that will require the use of Geograba and or Geometer's Sketchpad.

Exams: There will be two examinations prior to the final exam. These are tentatively scheduled for Tuesdays October 6 and November 24. Your final exam is scheduled for Tuesday December 15, 2:30 p.m. to 5:30 p.m.

Integrity: All work must be one's own and must comply with the Standards of Academic Integrity defined in the Elizabethtown College 2009-2010 Catalog.

Grading: 94-100 A; 90-93 A-; 87-89 B+; 83-86 B; 80-82 B-; 77-79 C+; 73-76 C; 70-72 C-; 67-69 D+; 63-66 D; 60-62 D-; below 60 F

Course Grades will be calculated according to the following weighting:
Homework: 25% Labs: 10% Hourly exams: 40% Final Exam: 25%

Disabilities: If you have a documented disability and need reasonable accommodations to fully participate in course activities or meet course requirements, you must:

1. contact the Director of Disabilities Services, Dr. Kristin Sagun, in the Center of Student Success, BSC 228 (361-1227).
2. Meet with me, the instructor, within two weeks of receiving a copy of the accommodation letter from Disability Services to discuss your accommodation needs and their implementation.

Tentative List of Sections to be Covered

1 Rules of the Road: Axiomatic Systems
1.1 Historical background
1.2 Axiomatic Systems and their Properties
1.3 Finite Geometries
1.4 Axioms for Incidence Geometry

2 Many Ways to Go: Axiom Sets of Geometry
2.1 Introduction
2.2 Euclid's Geometry and Euclid's Elements
2.3 Modern Euclidean Geometries
2.6 The SMSG Postulates for Euclidean Geometry
2.7 Non-Euclidean Geometries

3 Traveling Together: Neutral Geometry
3.1 Introduction
3.2 Preliminary Notions
3.3 Congruence Conditions
3.4 The Place of Parallels
3.5 The Saccheri-Legendre Theorem

4 One Way to Go: Euclidean Geometry of the Plane
4.1 Introduction
4.2 The Parallel Postulate and Some Implications
4.3 Congruence and Area
4.4 Similarity
4.5 Some Euclidean Results Concerning Circles
4.6 Some Euclidean Results Concerning Triangles
4.7 More Euclidean Results Concerning Triangles
4.8 The Nine Point Circle
4.9 Euclidean Constructions

6 Other Ways to Go: Non-Euclidean Geometry
6.1 Introduction
6.6 Showing Consistency: A Model for Hyperbolic Geometry
6.8 Elliptic Geometry: A Geometry with No Parallels?