MATH 2357 INTRODUCTION TO GEOMETRY CONCEPTS(3 credit hours)

Elmira College

SPRING 2025

Required Text:
H. S. M. Coxeter (1989). *Introduction to Geometry* (2th ed.). WILEY.
Supplemental readings might be included to illustrate or expand on textbook readings.

Pre-requisites: MATH 2130 Intermediate Mathematical Methods

Course Description

This course will introduce the basic theories and concepts of geometry. Topics cover Euclidean and non-Euclidean geometries, affine geometry, projective geometry, transformations and transformation groups. The course is designed to explore the principles, concepts and applications of geometry. Through theoretical research and practical application, students will develop a strong foundation in geometric reasoning, spatial visualization, and problem-solving skills.

Course Objectives and Goals

➢ Gain insights into the basic concepts of geometry, include euclidean and non-euclidean geometries.
➢ Explore the five postulates of euclidean geometry and their implications.
➢ Explore the relationship between algebraic equations and geometric shapes.
➢ Visualize and analyze three-dimensional shapes, enhancing spatial reasoning skills.
➢ Enhance understanding through the use of technology, promoting proficiency in applying geometric concepts in a digital context.

Evaluation of Performance

Your grade will be based upon your performance on exams, assignments, and participation.

Group Projects	40%
Quizzes	20%
Exams	40%
Total	100%

Grades will be assigned as follows:

A	93% and above	B-	80 - 82%	D+	67 - 69%
A-	90 - 92%	C+	77 - 79%	D	63 - 66%
B+	87 - 89%	C	73 - 76%	D-	60 - 62%
B	83 - 86%	C-	70 - 72%	F	59% or below

Withdrawal Policy: Please see Elmira College Bulletin for information on this policy.

Academic Honesty: Please read the section on Academic Honesty in the **Code of Conduct**. Briefly, academic dishonesty   includes: cheating, fabrication, facilitating academic dishonesty, and plagiarism. Ask if you have any questions on whether something constitutes as academic dishonesty. All work must be original and new. Past assignments from current or other courses will not be accepted. Academic dishonesty will not be tolerated. It will result in zero on the assignment, and a report will be filed with the school. Continued practice will result in failure of the class. Institutional penalties may also apply with repeated acts of academic honesty.

Student Responsibility:
- It is your responsibility to keep track of assignments and due dates.
- You should ask questions concerning assignments and lectures, if you need any clarifications.
- If you are struggling in class, have concerns, and/or unsure about expectations, please stop by during office hours or make an appointment for another time.

Tentative Schedule of Topics

Topic	Materials	Tasks & Evaluations
Isometry in the Euclidean Plane	Chapter 1	Quiz 1
Similarity in the Euclidean Plane	Chapter 2	
Circles and Spheres	Chapter 3	Exam 1
Isometry and Similarity in Euclidean Space	Chapter 4	
The Five Platonic Solids	Chapter 5	Group Project 1
Ordered Geometry	Chapter 6	
Affine Geometry	Chapter 7	Exam 2
Projective Geometry	Chapter 8	
Hyperbolic Geometry	Chapter 9	Group Project 2
Differential Geometry of Curves	Chapter 10	
Differential Geometry of Surfaces	Chapter 11	
Topology of Surfaces	Chapter 12	Exam 3
Four-Dimensional Geometry	Chapter 13	
The Golden Section and Phyllotaxis	Chapter 14	Group Project 3
Complex Numbers	Chapter 15	
Coordinates	Chapter 16	Quiz 2
Two-Dimensional Crystallography	Chapter 17	
Geodesics	Chapter 18	Exam 4